INTERSTATE 78

High-Occupancy-Vehicle Lane and Park-Ride Lot

Feasibility Study

The environmental impact statement for Interstate 78 between the present termini in Somerset and Union Counties recommended that, prior to construction of the highway, high-occupancy vehicle (HOV) lanes and park-ride lots be studied for their feasibility as measures to reduce traffic volumes. This report presents the results of this study.

HOV Lanes

The theory behind HOV lanes is that reserving a lane, or lanes, for high-occupancy traffic (usually three or more persons per vehicle) will allow this high-occupancy traffic to proceed at normal speeds during congestion, and thus will provide an impetus for a shift of people from low-occupancy vehicles to high-occupancy vehicles.

The eastern and western sections of I-78 have ten and six lanes respectively, and immediately suggest separate treatment in the analysis. The eastern section, which extends eastward from Route 24, consists of two roadways, an express and a local, in each direction. The express roadway is usually two twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. The local roadway is usually three twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. New Jersey barriers separate the four roadways. The western section, which extends westward from Route 24, consists of one roadway in each direction. Each roadway is usually three twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. A variable width grass median or a New Jersey barrier separates the two roadways.

A number of schemes were studied for these two sections:

1. Contraflow HOV lane on western section.

   This scheme proposes a contraflow HOV lane using the left most lane of the roadway in the off-peak direction. An unbuffered contraflow lane is usually considered safe only for use by professional drivers (i.e., bus and taxi). Since I-78 is expected to carry few buses or taxis the benefit would be non-existent. The narrow left shoulder would allow no pull-over areas for disabled vehicles in the contraflow HOV lane with obviously unsafe conditions resulting.

2. Concurrent HOV lane on western section.

   This scheme proposes a concurrent HOV lane using the left most lane of the roadway in the peak direction. No left-hand ramps exist in this section so there would be no conflicts with

exiting or entering traffic. The left-hand shoulder is not adequate enough to provide for enforcement efforts, and the present roadway configuration does not allow for a buffer zone between the HOV lane and the mixed lanes.

A high level of service is projected for I-78 west of I-287 and users of an HOV lane in this section would enjoy no advantage.

East of I-287 considerable congestion is projected. A detailed traffic-flow analysis indicates that establishment of the HOV lane would greatly lengthen the queues of several miles which are already predicted. Experience with this situation in other parts of the nation has shown that public outrage will not allow the HOV lanes to remain.

3. Contraflow HOV lanes on express roadways of eastern section.

This scheme proposes that both lanes of the express roadway in the off-peak direction be made HOV lanes. The directional split of traffic is such that the three local lanes could not accommodate all the travel in the off-peak direction.

4. Concurrent HOV lane on express roadways of eastern section.

This scheme proposes a concurrent HOV lane using the left lane of the express roadway in the peak direction. No left-hand ramps exist in this section, so there would be no conflicts with exiting or entering traffic. The left-hand shoulder is not adequate enough to provide for enforcement efforts. There is no room for a buffer zone between the HOV lane and the mixed lane. Having only one mixed lane on the express roadway would not allow slower vehicles to be passed without entering the HOV lane and breakdowns would result in extremely hazardous conditions.

Extreme congestion is projected for this section. Projected queues of several miles in length would be tremendously increased by establishing HOV lanes which would reserve twenty percent of the highway's capacity for the approximately eight percent of the vehicles which have more than two occupants. As mentioned earlier, the public would not tolerate this situation.

5. Concurrent HOV lane on local roadways of eastern section.

This scheme proposes a concurrent HOV lane using the left-most lane of the local roadway in the peak direction. At several locations the local roadway narrows to only two lanes which would leave only one lane for mixed traffic. All crossovers between the local and express roadways and a number of left-hand ramps off the local roadway would have to be closed. This would create an underutilized express roadway and a great incentive to use the highway mode to exactly those destinations best served by rail (e.g., Manhattan). The left-hand shoulder is not adquate to pro-

vide for enforcement efforts, and there is no room for a buffer zone between the HOV lane and the mixed lanes.

6. Concurrent HOV lanes on express roadways of eastern section.

This scheme proposes concurrent HOV lanes using both lanes of the express roadway in the peak direction. This scheme will not require the closing of any ramps. A shoulder for disabled vehicles and to provide for enforcement efforts would be available, and a buffer zone would exist between the HOV and mixed lanes.

Extreme congestion is projected for this section. Projected queues of several miles in length would be tremendously increased by establishing HOV lanes which would reserve forty percent of the highway's capacity for the approximately twenty-four percent of the vehicles which have more than one occupant. As mentioned earlier, the public would not tolerate this situation.

In light of the considerations presented for each of the HOV-lane schemes, it was concluded that the establishment of HOV lanes on I-78 is not feasible.

Park-Ride Lots

Carpool park-ride lots encourage ridesharing by providing a site enroute to the destination for travelers from diverse origins to meet and transfer to a single vehicle. In the absence of such sites carpoolers are required to park along the shoulder where they cause friction to the traffic flow and encroach upon the adjacent land owners' presumed parking rights, or to park on private property where they are usually unwelcome.

This analysis has been undertaken to identify park-ride lot sites to serve the users of I-78. These sites will both encourage ridesharing to help alleviate the projected congestion on I-78 and eliminate the adverse impact that commuter parking would otherwise have on the public.

The criteria used in site selection are:

1. Maximize convenience for carpool users (e.g., accessability, no further from home than necessary).

2. Minimize cost to provider (e.g., land acquisition, grading).

3. Minimize cost to public (e.g., property taking).

4. Minimize diversion from transit to carpooling (e.g., transit parking should be as convenient as carpool parking).

Based on these criteria, sites requiring building demolition and/or extensive grading have been excluded, and improvements to transit parking lots have been considered and recommended where appropriate to minimize

travel on I-78 and enhance carpooling by virture of the increased flexibility transit affords to carpoolers as a fall back option in the event of a missed ride.

At each location identified, a field survey was made to locate possible sites for the estabishment of park-ride lots. Excess parcels owned by the Department were reviewed for their suitability as lot sites. Each railroad station lot in the corridor was reviewed for its suitability as a carpool lot taking into account the probable implications for the railroad's competitive position in the face of the construction of carpool lots along I-78.

The potential need for over 2,000 park-ride spaces, spread over 17 possible sites, was identified. The Department is currently exploring the feasibility of providing such parking at each of the sites identified. On the following page is a table summarizing the size and location of the proposed park-ride lots. First priority is given to constructing lots on State-owned property. Second priority is given to constructing lots of 100 or more spaces on land that must be purchased. Third priority is given to negotiated, joint-use, existing lots on private property. Fourth priority is given to constructing lots of less than 100 spaces on land that must be purchased.

The Department's current resources will allow advancement of proposals only in the first and third priority categories. Therefore, it is recommended that the implementation of this study's proposals be considered an integral part of the I-78 project and made eligible for ninety percent federal funding. This would allow advancement of proposals in the second and fourth priority categories. The actual number of the 2000 proposed spaces that can ultimately be provided will be determined by the findings of the engineering feasibility studies, negotiations with owners of joint-use lots, and the Department's other financial obligations and limitations.

I-78 PARK-RIDE LOTS

INTERCHANGE SERVED BY PROPOSED LOT	NUMBER OF SPACES	LOCATION	PRESENT OWNERSHIP	PRIORITY
I-78/NJ 124	220	At Interchange	Private	3
I-78/24 Freeway	50	24F/Springfield Ave.	State	1
	100	Interchange	Private	2
"	200	Proposed 24F Interchanges	State	1
"	80	At NJ 10/I-287 Interchange	State	1
"	50	NJ 24 West of Morristown	Private	4
"	200	At Co. 511/I-287 Interchange	Private	3
I-78/Co. 531	50-100	Gillette Rail Station	State	1
"	250-300	On US 22	Private	3
	10		State	1
"	100	AT Interchange	Private	3
I-78/527 Spur	125	At Interchange	Private	3
I-78/Co. 525	200	At Interchange	Private	2
I-78/I-287	200	Shopping Center at 202-206-28 Circle	Private	3
"	100	Co. 523/I-78 Interchange	Private	2
"	20	Co. 523 Spur/I-78 Interchange	Private	4
"	40	US 22, Lebanon	Private	4
"	40	NJ 31/I-78 Interchange	Private	4

INTERSTATE 78

HIGH OCCUPANCY VEHICLE LANE AND PARK-RIDE LOT

FEASIBILITY STUDY

Introduction

It has been suggested that the establishment of HOV lanes and park-ride lots may be desirable adjuncts to the completion of the missing link of I-78 in Union County. This report will analyze the feasibility and desirability of establishing HOV lanes on I-78 and park-ride lots in the I-78 corridor, in light of potential use, physical, financial, and public acceptability considerations.

Background

The missing link extends east from Plainfield Avenue in Watchung Boro six miles to NJ Route 24 in Springfield Township. With the completion of the missing link and 24 Freeway, I-78 will divert traffic from slower and less direct routes. Traffic projections for 1985 show I-78 to be at level of service E in the design hour from Glenside Road (near the middle of the missing link) east. In addition, an assignment of the 1970 Census Journey-to-Work trip table, factored to 1990 AM peak hour, to the statewide traffic model network reveals an unrestrained demand on I-78 which in some locations is over twice the theoretical capacity. Therefore, the desirability of increasing ridesharing on I-78 and in the I-78 corridor is obvious.

An analysis year of 1990 was chosen because it would encompass the completion of intersecting Route 24 Freeway and would allow traffic patterns to stabilize on I-78 after completion of the missing link. The statewide traffic model network was modified to reflect a 1990 configuration.

Other transportation facilities in the I-78 corridor serving trips similar to those served by I-78 are US Route 22 and NJ Transit's Gladstone, Morristown, and Raritan Valley rail lines (Figure 1). Route 78 has no bus service and none is projected. There exists bus service in the corridor

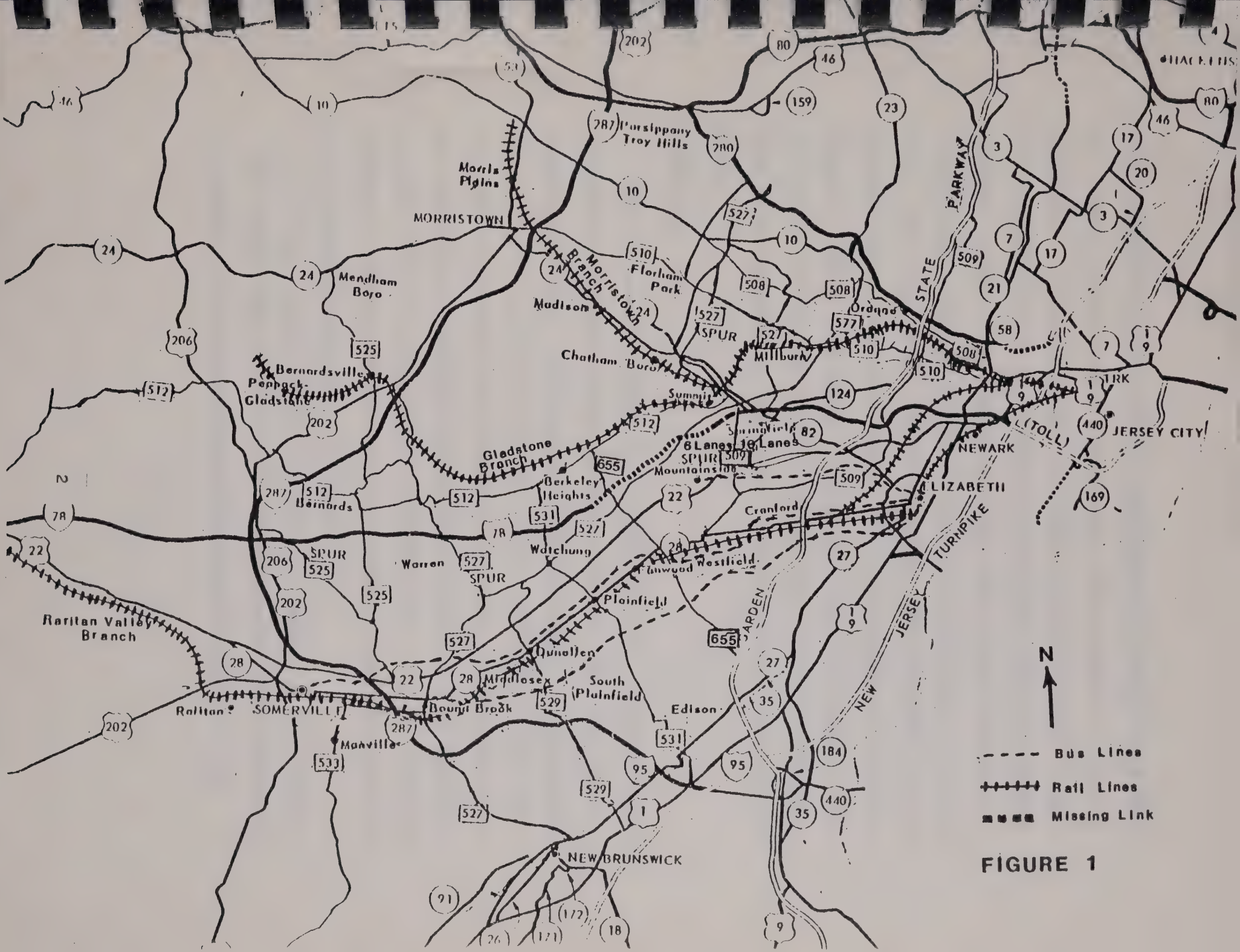
Morris Plains
MORRISTOWN
Parsippany Troy Hills
Florham Park
Madison
Chatham Boro
Millburn
Mendham Boro
Bernardsville
Peapack-Gladstone
Gladstone Branch
Morristown Branch
Summit
Berkeley Heights
Warren
Watchung
Plainfield
Cranford
Westfield
Scotch Plains
Raritan Valley Branch
SOMERVILLE
Raritan
Bound Brook
Manville
Middlesex
South Plainfield
Edison
Metuchen
NEW BRUNSWICK
Garden State Parkway
New Jersey Turnpike
NEWARK
ELIZABETH
JERSEY CITY
(TOLL)
6 Lanes
10 Lanes
SPUR
Mountainside
N
Bus Lines
Rail Lines
Missing Link

FIGURE 1

south of Route 22 and some of these lines traverse the eastern end of Route 22. Figure 2 lists for each transportation mode the percent of trips by destination. It can be seen that the commuter rail mode is almost exclusively oriented to Newark and Manhattan with only nine percent of the trips destined elsewhere. The highway mode also shows a high orientation to Newark with the remaining destinations more diffuse than those of the rail mode. The bus trips are primarily oriented toward Elizabeth with the remaining destinations widely scattered as in the highway mode but with a somewhat different orientation. The apparent relative diffuseness of the bus trips is probably the result of sampling error, due to the relatively small number of bus trips, rather than an actual difference between the two modes.

Travel Data

The two sources of travel data available for this analysis are the Department's design-hour traffic projections and the 1970 Census Journey-to-Work trip tables. The Department's numbers are capacity restrained and were used as the source of the traffic volumes. The Census Journey-to-Work was used as the source of the distribution of origins and destinations. It was felt that this distribution was the best available and would adequately represent the distribution of all AM peak-hour trips. A field survey was conducted to measure vehicle occupancy at a number of locations on Route 22 and the existing portions of I-78 (Figure 3).

The Census Journey-to-Work trip table was assigned to the 1990 statewide traffic model network to produce origin and destination information by highway link and an interchange-to-interchange trip table for I-78.

PERCENT OF TOTAL TRIPS BY DESTINATION FOR EACH TRANSPORTATION MODE**

HIGHWAY		COMMUTER RAIL		BUS	
Newark	26	Holland Tunnel*	37	Elizabeth	20
Lincoln Tunnel	6	Lincoln Tunnel*	33	Lincoln Tunnel*	9
Union	6	Newark	21	Newark	8
Jersey City	5	East Orange	2	East Orange	4
New Providence	4	Jersey City	2	Linden	4
East Orange	4	Kearny	1	Kearny	4
Irvington	3	Hoboken	1	North Plainfield	3
Summit	3	All others	3	Irvington	3
Holland Tunnel	3			Union	3
Springfield	3	Total	100	Plainfield	3
Kearny	2			Bloomfield	3
Bayonne	2			Harrison	2
Linden	2			Belleville	2
Elizabeth	2			Kenilworth	2
Maplewood	2			Holland Tunnel*	1
North Bergen	1			Scotch Plains	1
Bloomfield	1			George Washington Bridge*	1
Millburn	1			North Bergen	1
Berkeley Heights	1			Westfield	1
Cranford	1			Roselle	1
All others	22			Cranford	1
				South Orange	1
Total	100			Millburn	1
				Maplewood	1
				Jersey City	1
				Livingston	1
				Montclair	1
				Nutley	1
				West Orange	1
				Orange	1
				All others	14
				Total	100

*Most likely Hudson River Crossing if trip were by auto.

**Based on 1970 Census Journey-to-Work trips as assigned to 1990 traffic-model network and as compared to an inventory of bus routes.

Figure 2.

Peak Hour Percent of Vehicles by Vehicle Occupancy

Route	Location	Vehicle Occupancy		
		1	2	3+
I-78	West of I-287	79.2	15.9	4.9
I-78	West of G.S.P.	80.8	15.7	3.5
I-78	East of G.S.P.	77.4	17.0	5.6
22	Adjacent to missing link	82.8	13.8	3.4

Figure 3.

Using Federal Energy Administration guidelines[1] the existing modal shares were altered to reflect 1990 travel costs. Auto travel currently costs 15.91 cents per mile. It was estimated that the cost of auto travel would increase in today's dollars by 10.73 cents per mile taking into consideration increasing gasoline costs and increasing automotive fuel economy. Transit fares were assumed to rise at the rate of inflation which results in no change in cost in today's dollars. The rail and auto shares were found to go from 54% and 46% respectively in 1980 to 62% and 38% respectively in 1990. (Bus trips were not considered since they have a fairly unique geographic orientation and their numbers are not sufficient to significantly alter the analysis.) Within the auto mode the 1980 split of 80% drive alone, 15% two persons per car, and 5% three or more persons per car can be expected to shift to 77% drive alone, 18% two persons per car, and 5% three or more persons per car by 1990. The shift from auto to rail is probably over estimated due to the disparity in the distributions of destinations.

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1 "Guidelines for Travel Demand Analysis of Program Measures to Promote Carpools, Vanpools, and Public Transportation," Cambridge Systematics, Inc., Cambridge Mass., November 1976.

HOV Lane Feasibility

Selection of Schemes for Detailed Traffic Flow Analysis

The eastern and western sections of I-78 have ten and six lanes respectively and immediately suggest separate treatment in the analysis (Figure 1). Route 24 is the dividing line between the two sections. The eastern section consists of two roadways, an express and a local, in each direction. The express roadway is usually two twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. The local roadway is usually three twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. New Jersey barriers separate the four roadways. The western section consists of one roadway in each direction. Each roadway is usually three twelve-foot lanes with a ten-foot right shoulder and a two-to-four-foot left shoulder. A variable width grass median or a New Jersey barrier separates the two roadways. Both sections are illustrated in Figure 4.

1. Contraflow HOV lane on western section.

   This scheme proposes a contraflow HOV lane using the left most lane of the roadway in the off-peak direction (Figure 5a). An unbuffered contraflow lane is usually considered safe only for use by professional drivers (i.e., bus and taxi). Since I-78 is expected to carry few buses or taxis the benefit would be non-existent. The narrow left shoulder would allow no pull-over areas for disabled vehicles in the contraflow HOV lane with obviously unsafe conditions resulting. This scheme was rejected for further analysis.

2. Concurrent HOV lane on western section.

   This scheme proposes a concurrent HOV lane using the left most lane of the roadway in the peak direction (Figure 5b). No left-hand

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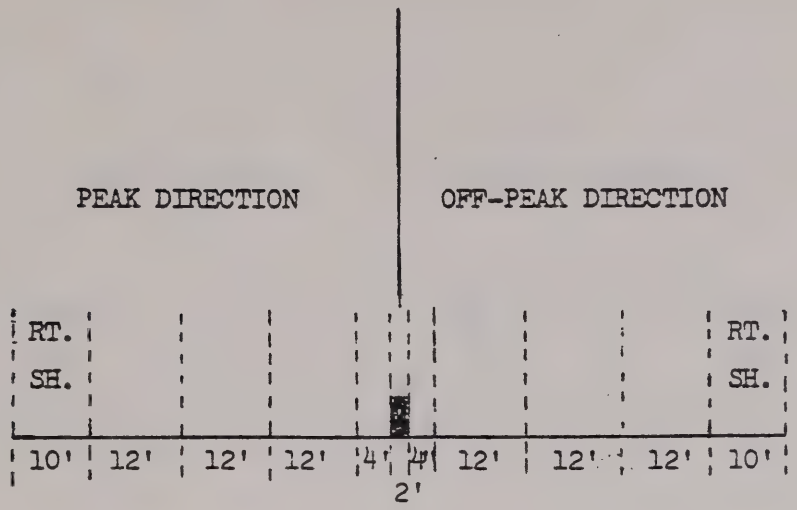

RT. 78 EASTERN SECTION

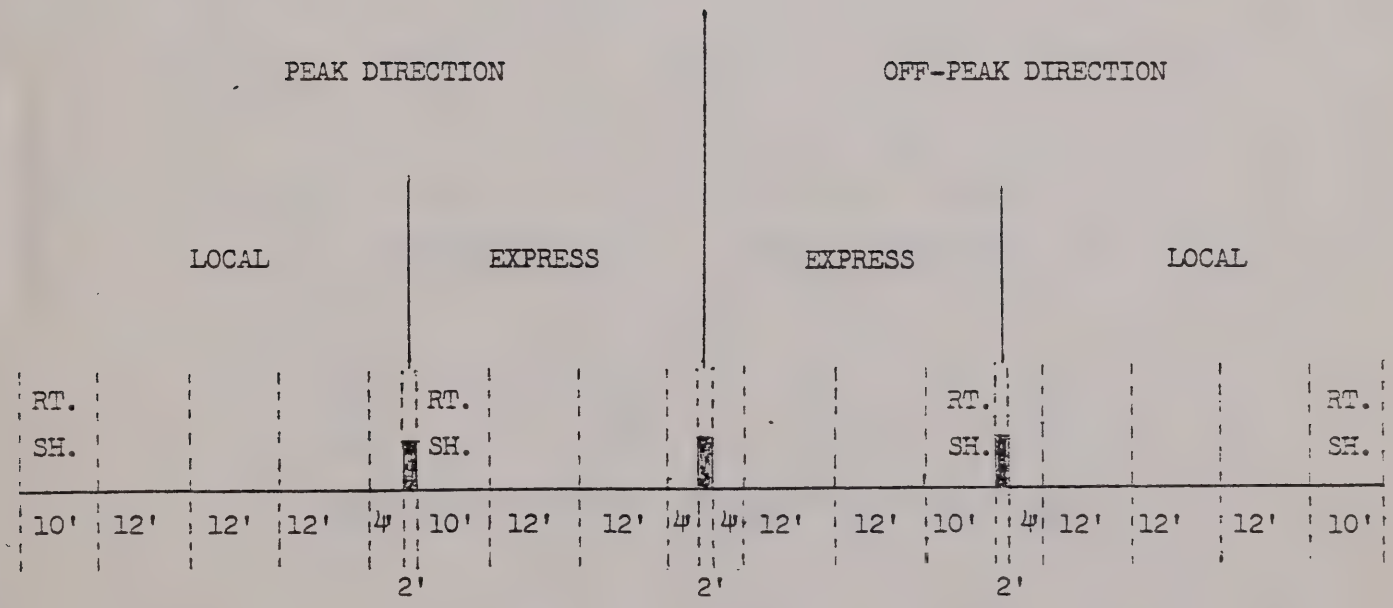

Figure 4. Standard Cross Sections

RT. 78 WESTERN SECTION

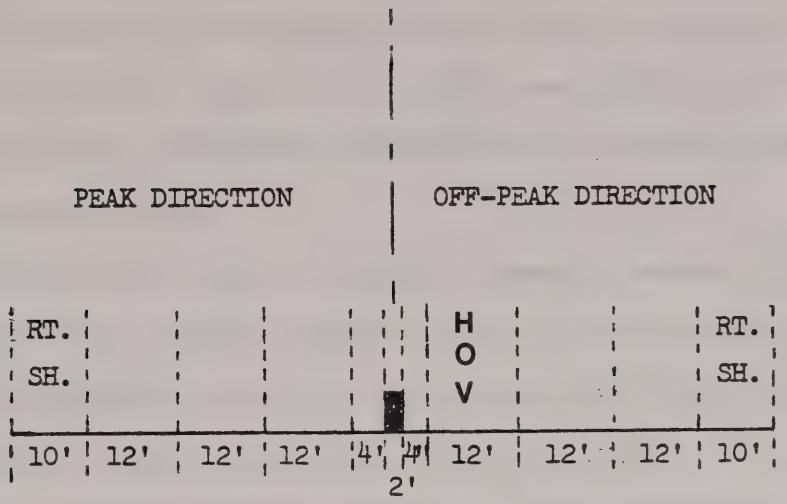

Figure 5a. Contraflow HOV lane.

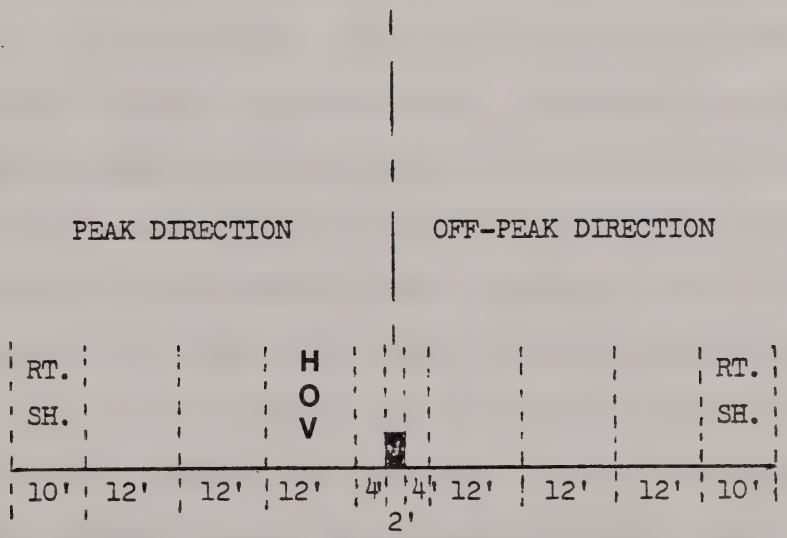

Figure 5b. Concurrent HOV lane.

ramps exist in this section, so there would be no conflicts with exiting or entering traffic. While the left-hand shoulder is not adequate to provide for enforcement efforts, and the present roadway configuration does not allow for a buffer zone between the HOV lane and the mixed lanes, this scheme was retained for further analysis because of its potential merit.

3. Contraflow HOV lanes on express roadways of eastern section.

This scheme proposes that both lanes of the express roadway in the off-peak direction be made HOV lanes (Figure 6). The directional split of traffic is such that the three local lanes could not accommodate all the travel in the off-peak direction. This scheme was rejected for further analysis.

4. Concurrent HOV lane on express roadways of eastern section.

This scheme proposes a concurrent HOV lane using the left lane of the express roadway in the peak direction (Figure 7). No left-hand ramps exist in this section, so there would be no conflicts with exiting or entering traffic. There is no room for a buffer zone between the HOV lane and the mixed lane. Having only one mixed lane on the express roadway would not allow slower vehicles to be passed by other non-HOV vehicles without entering the HOV lane. Since the left-hand shoulder is not adequate enough to provide police a location for observation and no U-Turn slots exist, this could cause an enforcement problem which could threaten the continuity of the priority lane. Police could only observe the lane from the right shoulder with a lane of traffic between them and the HOV lane; this would make it difficult to determine the occupancy of the vehicles. Relocating the shoulder to

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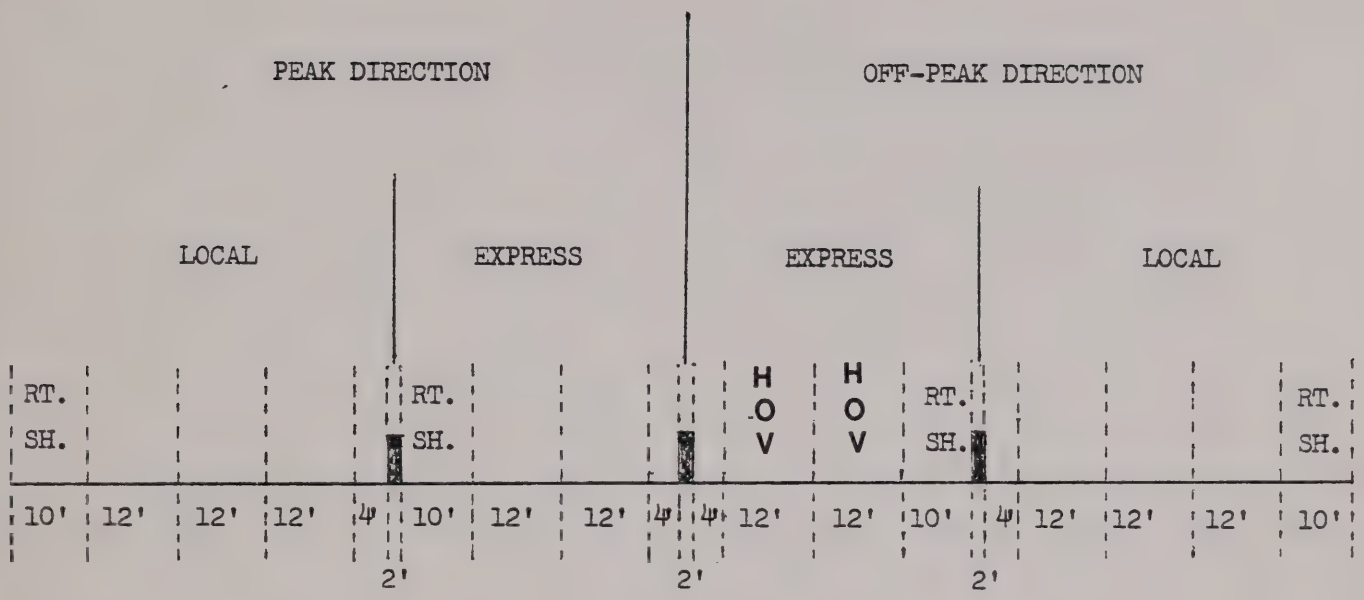

Figure 6. Contraflow lanes on express roadways of eastern section.

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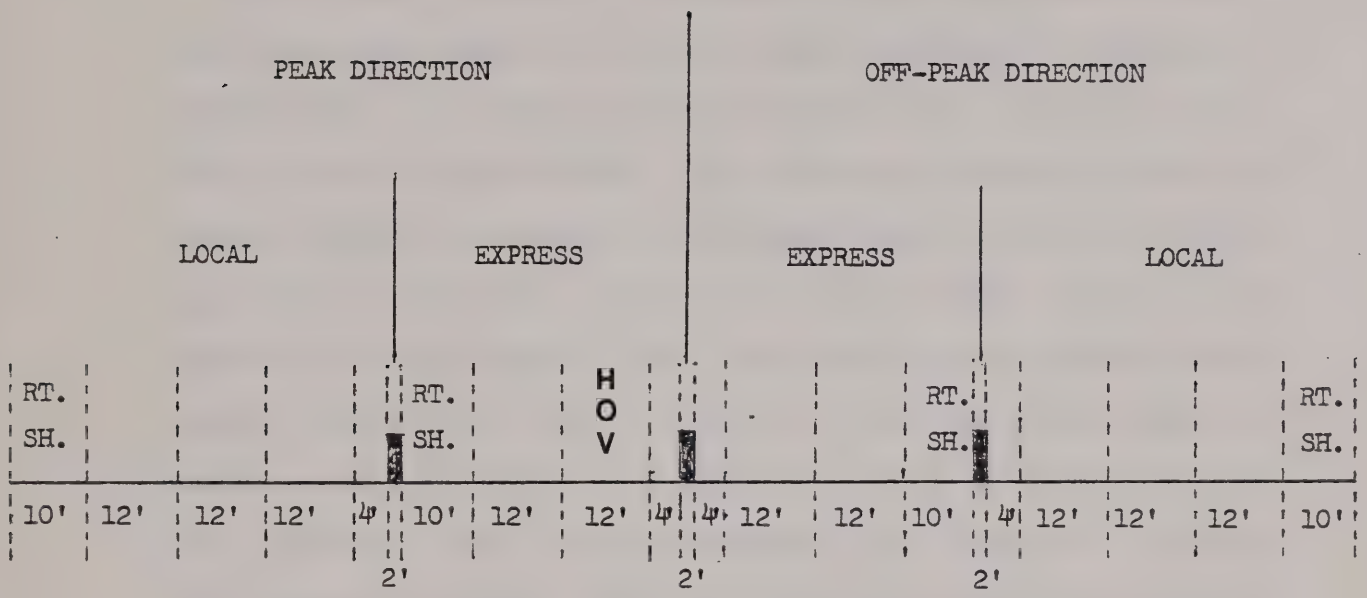

Figure 7. Concurrent HOV lane on express roadways of eastern section.

the left side of the roadway would help the enforcement problem but would result in extremely hazardous conditions in the event of a breakdown in the mixed lane. Although these geometric problems exist and congestion in the mixed lanes is expected, this scheme was retained for further analysis.

5. Concurrent HOV lane on local roadways of eastern section.

This scheme proposes a concurrent HOV lane using the left most lane of the local roadway in the peak direction (Figure 8). At several locations the local roadway narrows to only two lanes which would leave only one lane for mixed traffic. All crossovers between the local and express roadways and a number of left-hand ramps off the local roadway would have to be closed. Use of the express roadway would then be limited to only the longest trips. This would create an underutilized express roadway and a great incentive to use the highway mode to exactly those destinations best served by rail (i.e., Newark, Jersey City, Manhattan). The left-hand shoulder is not adequate to provide for enforcement efforts. There is no room for a buffer zone between the HOV lane and the mixed lanes. This scheme was rejected from further consideration.

6. Concurrent HOV lanes on express roadways of eastern section.

This scheme proposes concurrent HOV lanes using both lanes of the express roadway in the peak direction (Figure 9). This scheme will not require the closing of any ramps. A shoulder for disabled vehicles and to provide for enforcement efforts would be available. A buffer zone would exist between the HOV and mixed lanes. Although congestion in the mixed lanes was anticipated, this scheme was retained for further analysis.

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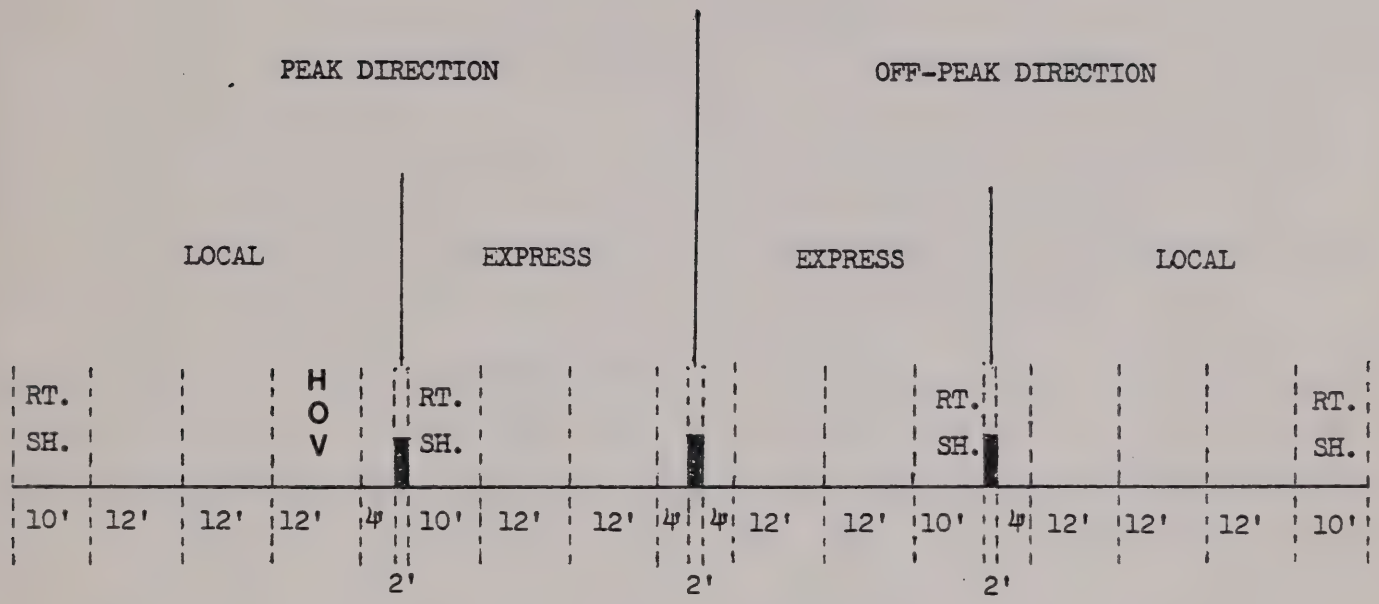
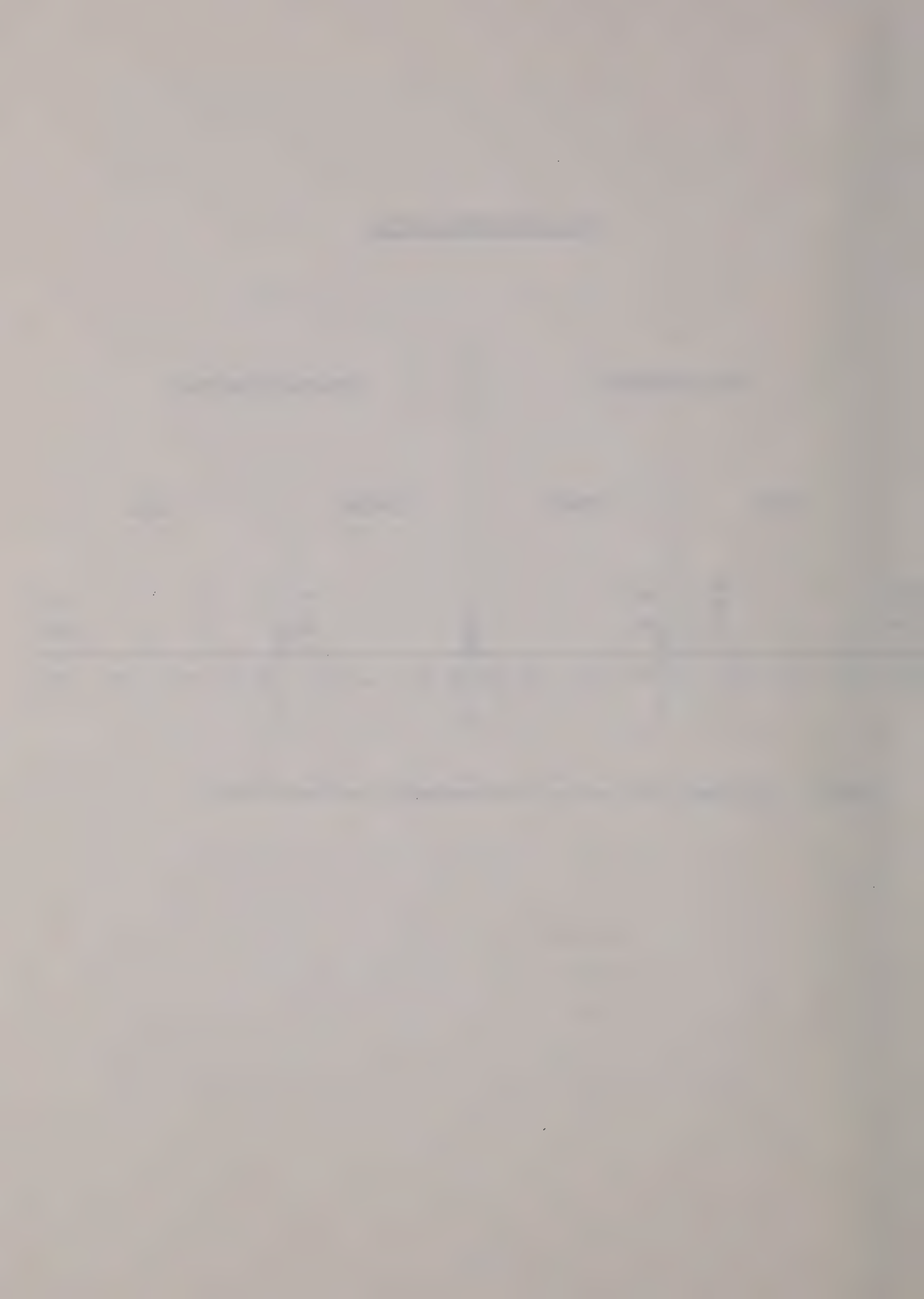


Figure 8. Concurrent HOV lane on local roadways of eastern section.



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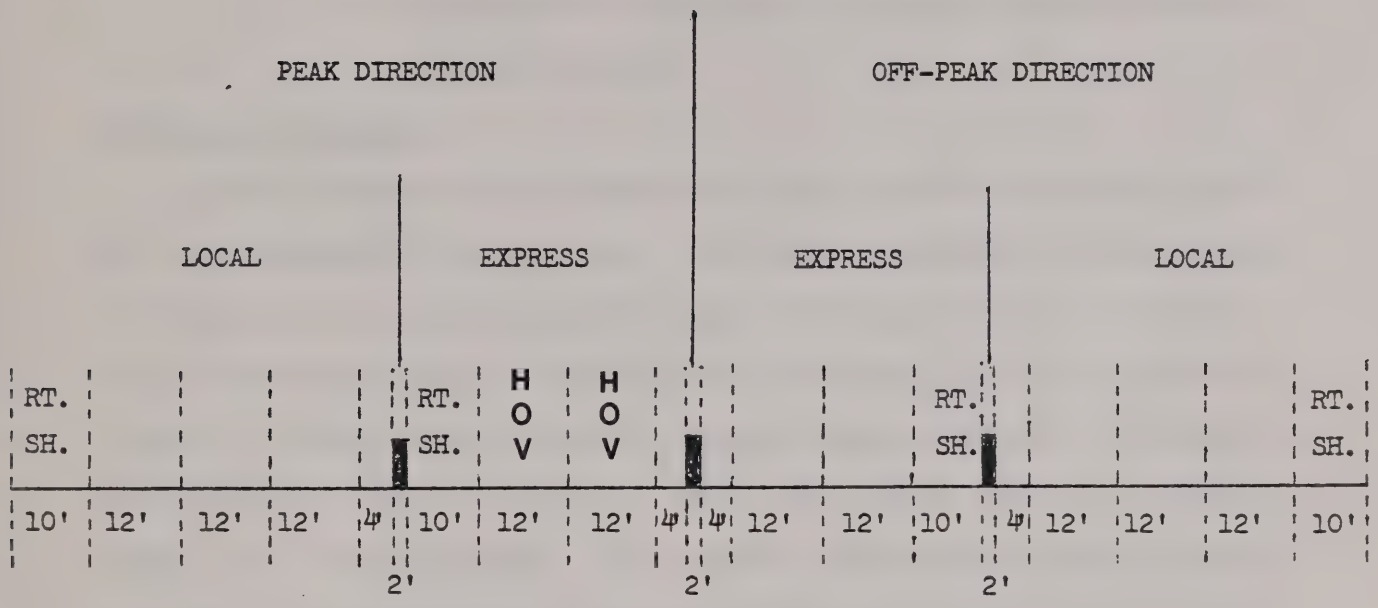

Figure 9. Concurrent HOV lanes on express roadways of eastern section.

In summary, three schemes were devised which were considered worthy of a detailed traffic flow analysis:

1. Concurrent HOV lane using left most lane of roadways on western section.
2. Concurrent HOV lane using left lanes of express roadways of eastern section.
3. Concurrent HOV lane using both lanes of express roadways of eastern section.

Traffic Flow Analysis

A computer model entitled PRIFRE was used to analyze the impact of the HOV lane schemes on traffic flow. The model is capable of identifying bottleneck areas, measuring queue length, and estimating level of service. Input requirements are an interchange-to-interchange trip table, peak-hour volumes by fifteen-minute intervals, vehicle occupancy factors, and roadway characteristics such as number of lanes, lane width, lateral clearance, grades, and percent trucks. The roadway characteristics were readily available. Vehicle occupancy factors were calculated for 1990 as described earlier in this report. Fifteen-minute-interval factors for peak-hour volumes were estimated from permanent counting stations on I-80. The interchange-to-interchange trip table was developed using the 1990 design-hour volumes and the 1970 Census Journey-to-Work trip table.[2]

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[2]It was decided to use the 1990 design-hour volumes to estimate the magnitude of travel and the Journey-to-Work trip tables to estimate the interchange-to-interchange movement patterns. To do this it was necessary to factor the Journey-to-Work trip tables to produce design-hour trip

The original intention was to use 1990 traffic estimates in this analysis. As mentioned earlier the traffic projections predict that the road will be operating at capacity from the middle of the missing link east and that there will be considerable unserved demand for some locations. Since the only HOV lanes that have proved successful have been those where there has been only moderate congestion (up to level of service E) in the mixed lanes, this situation immediately precludes the establishment of HOV lanes. Therefore, it was decided to try a less conservative approach and switch the analysis to six months after the opening of the missing link in 1985. It was estimated that the traffic volumes at this time period would be sixty percent of those estimated for 1990.

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tables. It was readily apparent that the Journey-to-Work trip table could not be factored to conform with the design-hour volume estimate of every link and ramp on I-78. Therefore it was decided to factor the trip table so that when assigned to the 1990 traffic-model network it would produce the same vehicle miles of travel (VMT) on I-78 east of I-287 as would be produced by the design-hour volumes. An assignment of the Journey-to-Work trip table to the traffic model network produced the VMT which was then divided into the design-hour VMT for the same section of I-78 to yield the required factor. The factored trip table was then assigned to the 1990 traffic model network and the interchange-to-interchange trip table was developed.

1. Analysis of Eastern Section

The configuration of the scheme is shown in Figures 7 and 9.

Six months after the opening of the missing link and without HOV lanes, this section will have areas where projected unrestrained demand will exceed capacity by nearly twenty-five percent. For example, the section between Route 24 Freeway and Springfield Avenue has a capacity of 8,810 vehicles per hour and the demand projected is 10,525 vehicles in the peak hour. This would cause a queue on I-78 of several miles and, depending on successive hourly volumes, the resulting congestion could last for the entire peak period. The HOV lane scheme using both lanes of the express roadway would increase this queue tremendously because forty percent of the capacity would be reserved for the approximately twenty-four percent of the vehicles which have more than one occupant. The HOV lane scheme using one lane of the express roadway would also increase this queue tremendously because twenty percent of the capacity would be reserved for approximately eight percent of the vehicles which have more than two occupants. (Opening the HOV lane to two-occupant vehicles would result in an HOV demand in excess of capacity.)

Experience with this situation in other parts of the nation has shown that public outrage will not allow the HOV lanes to remain. Therefore, this scheme was rejected due to public unacceptability and a simulation using the PRIFRE model was not performed.

2. Analysis of Western Section

A high level of service is projected for I-78 west of I-287 and users of an HOV lane in this section would enjoy no advantage. This westernmost section was rejected from further consideration because there was no potential for inducing and/or perpetuating ridesharing.

East of I-287 to the western end of the ten-lane section the scheme shown in Figure 5b was chosen for traffic flow analysis. This section was simulated by PRIFRE for normal operation, an HOV lane with a two-or-more-occupants-per-vehicle restriction, and an HOV lane with a three-or-more-occupants-per-vehicle restriction.

a. Eastbound

It was determined that under normal operation, queues would form near the Hillcrest Avenue and Diamond Hill Road interchanges six months after the opening of the missing link. This would be due largely to the heavy on-ramp volumes at these interchanges. Queues on I-78 would be approximately two miles long. In 1990, these queues would be nearly five miles long and the two on-ramps would also have large queues waiting to get on I-78.

Under the two-or-more-occupants-per-vehicle HOV lane plan, six months after the opening of the missing link the same area would be congested to a greater extent. The queues on I-78 would extend approximately four miles and the ramps would also have some queuing. In 1990, six-mile queues on I-78 would exist with enormous queues on the two on-ramps. The travel time differential between HOV-lane users and mixed-lane users would not be great enough to cause a measurable mode shift to high occupancy vehicles.

The three-or-more-occupants-per-vehicle HOV-lane plan, at the six month point, showed, in the same area, queues of approximately six miles on I-78 with large queues on the on-ramps. In 1990, eight-mile queues would be present with enormous queues on the two on-ramps. The travel time differential between HOV-lane users and mixed-lane users would not be great enough to cause a measurable mode shift, and, for some HOV-lane users, the travel time would actually be greater than it would be without an HOV lane due to the congestion the lane would cause.

b. Westbound

Six months after the opening of the missing link, under normal operations, the roadway would be congested in two areas. A queue of two and one-half miles would exist east of Glenside Avenue and another of one-half mile would exist east of Hillcrest Avenue. The Hillcrest off-ramp would also be over capacity by nearly four hundred vehicles. In 1990, the queue would be six miles long on I-78, the Route 24 Freeway on-ramp would be over capacity by nearly three hundred and fifty vehicles and the Hillcrest Avenue off-ramp would be nearly seven hundred vehicles over capacity.

In the same area and at the six-month point the two-or-more-occupants-per-vehicle HOV-lane plan would produce queues five miles long on I-78 and the off-ramp would be over capacity. In 1990, the queues on I-78 would be eight miles long and the on-ramps and off-ramps would be over capacity. The travel time differential between HOV-lane users and mixed-lane users would not be great enough to cause a measurable mode shift to high occupancy vehicles.

Under the three-or-more-occupants-per-vehicle HOV-lane plan the queues would be slightly longer than under the two-or-more-occupants-per-vehicle HOV-lane plan and the on-ramps and off-ramps would be over capacity. Travel time would increase for all HOV lane users and for some would be greater than it would be without the HOV lane. No increase in the three-or-more-occupant vehicles would occur but the congestion would cause a mode shift from two-or-more-occupant vehicles to transit of several percent.[3]

The scheme to establish an HOV lane in the section of I-78 between I-287 and the western end of the ten-lane section was rejected as politically unfeasible for reasons given in the analysis of the eastern section.

3. Conclusion

It is neither publicly acceptable nor purposeful to establish an HOV lane on I-78 east of I-287 and it is not purposeful to establish an HOV lane west of I-287.

Further Thoughts

While this analysis concludes that HOV lanes on I-78 should not be established, the extensive congestion predicted for the I-78 corrdior under present transportation schemes is telling. The corridor enjoys an extensive commuter rail system, one that serves over half of the AM-peak-hour trips. Obviously something needs to be done, and the rail system would seem to suggest itself as a part of the solution.

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[3]Cambridge Systematics, op. cit.

The origin and destination data show that a large percentage of the peak-hour trips in the I-78 corridor are destined to Newark. These trips are split nearly equally between the rail and auto modes. Newark is the most common auto destination with 26% of the auto trips destined there. With the highway congestion projected for this corridor, these trips should be ripe for diversion to rail if service conditions are conducive. Further analysis of this issue will be necessary to identify disincentives to such diversion.

Park-Ride Lot Feasibility

Carpool park-ride lots encourage ridesharing by providing a site enroute to the destination for travelers from diverse origins to meet and transfer to a single vehicle. In the absence of such sites, carpoolers are required to park along the shoulder where they cause friction to the traffic flow and encroach upon the adjacent land owners' presumed parking rights, or to park on private property where they are usually unwelcome.

This analysis has been undertaken to identify park-ride lot sites to serve the users of I-78. These sites will both encourage ridesharing to help alleviate the projected congestion on I-78 and eliminate the adverse impact that commuter parking would otherwise have on the public.

The criteria used in site selection are:

1. Maximize convenience for carpool users (e.g., accessability, no further from home than necessary).
2. Minimize cost to provider (e.g., land acquisition, grading).
3. Minimize cost to public (e.g., property taking).
4. Minimize diversion from transit to carpooling (e.g., transit parking should be as convenient as carpool parking).

Based on these criteria, sites requiring building demolition and/or extensive grading have been precluded and improvements to transit parking lots have been considered and recommended where appropriate to minimize travel on I-78 and enhance carpooling by virtue of the increased flexibility transit affords to carpoolers as a fall back option in the event of a missed ride.

The identification and quantification of park-ride lot demand was based on relationships observed elsewhere in the State between utilization of park-ride lots, and travel and socio-economic data. The development of these relationships is detailed in Appendix A. In brief, the best predictive variables of potential park-ride site utilization are 1970 Census based Journey-to-Work trips entering an interchange and the number of households in the origin municipalities of these trips. The 1980 Census Journey-to-Work data is not yet available.

The pattern of work trips using I-78 was determined by assigning the 1970 Census Journey-to-Work trip table to the 1990 statewide traffic-model network. The trip tables developed for each interchange and the trip paths were input into the demand relationships and the subjective analysis to estimate magnitudes and locations of demand.

At each demand location identified, a field survey was made to locate possible sites for the establishment of park-ride lots. Excess parcels owned by the Department were reviewed for their suitability as lot sites. Each railroad station lot in the corridor was reviewed for its suitability as a carpool lot taking into account the probable implications for the railroad's competitive position in the face of the construction of carpool lots along I-78.

The results of this demand-supply analysis are presented in the following pages in order by interchange from east to west. The referenced equation relating travel/socio-economic characteristics and demand is discussed at length in Appendix A.

Appendix B lists certain ridesharing activities in the corridor.

Interchange with Garden State Parkway

The Garden State Parkway has an extensive system of park-ride lots and an ongoing program of monitoring and expansion which should well serve this interchange.

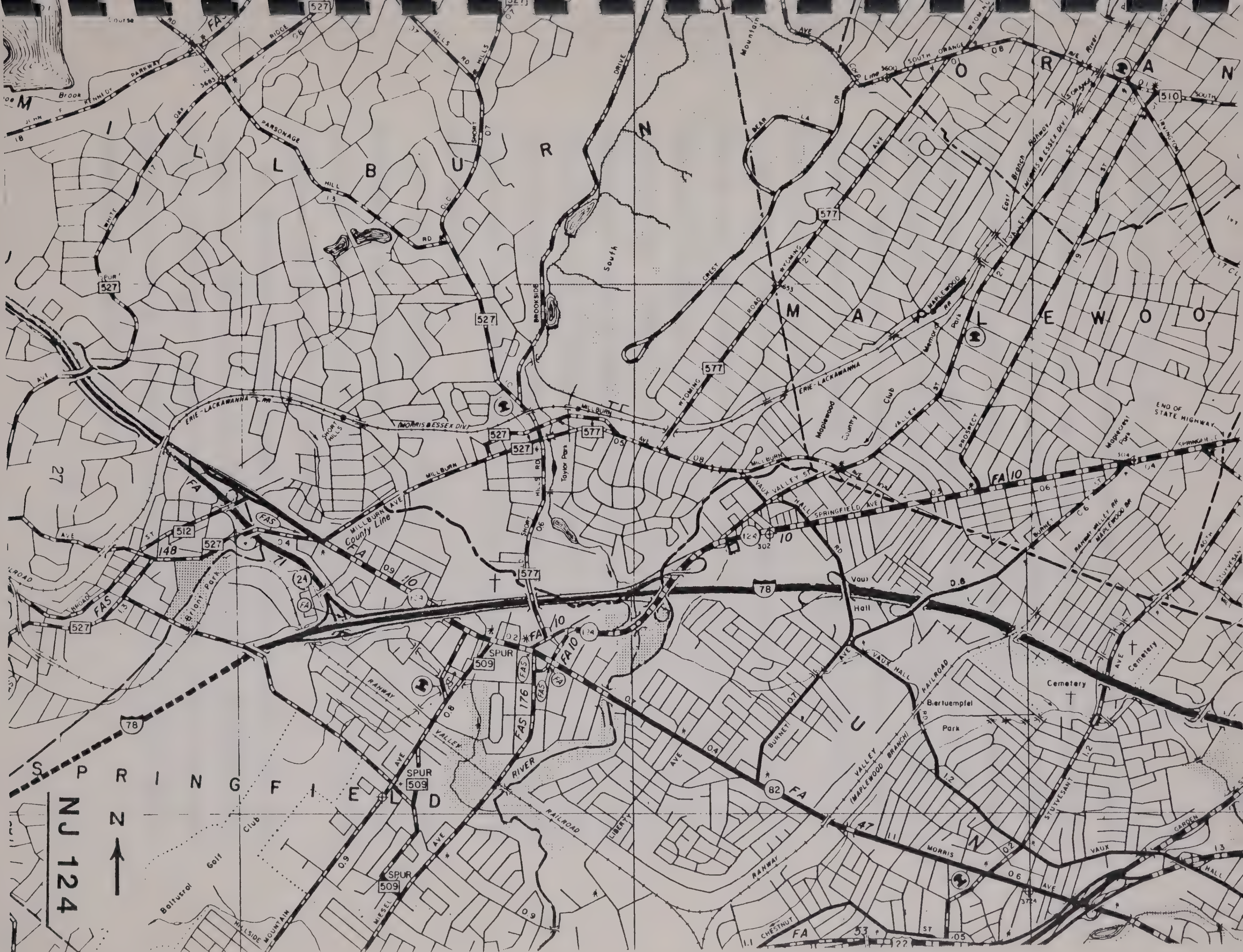
Interchange with New Jersey Route 124

The equation shows the potential need for over 220 spaces. The origins of the users are split nearly evenly between Maplewood and Springfield.

The nearest rail station is "Maplewood". Parking at this station is without restriction or charge. The available spaces are fully utilized. Expansion would involve taking adjacent park or residential property.

Just north of I-78 on the right-hand side of Route 124 is the Union Market with a very large lot with plenty of extra spaces. There are four cars parked here which appear to be commuters. The remainder of Route 124 near the interchange presents no opportunities for the establishment of a park-ride lot.

The Union Market lot is recommended as the most reasonable site to provide parking for carpoolers using this interchange. This lot would also serve as a meeting point for carpools with members using Route 24 and I-78 west of Route 24.



M I L L B U R N
M A P L E W O O D
S P R I N G F I E L D
O R A N
U N
NJ 124
N
527
SPUR 527
577
512
510
148
509
SPUR 509
78
10
FA 10
FA 82
FAS 176
ERIE-LACKAWANNA RR
MORRIS & ESSEX DIV
MILLBURN AVE
County Line
SHORT HILLS
Taylor Park
Maplewood Country Club
Memorial Park
Maplecrest Park
END OF STATE HIGHWAY
SPRINGFIELD AVE
VAUX VALLEY ST
VAUX HALL RD
RAHWAY VALLEY RR
MAPLEWOOD BR
Biertuempfel Park
Cemetery
Baltusrol Golf Club
Briant Park
RAHWAY VALLEY (MAPLEWOOD BRANCH) RAILROAD
RIVER
MORRIS AVE
CHESTNUT ST
STUYVESANT AVE
LIBERTY AVE
BURNET AVE
MILLSIDE MOUNTAIN
PARSONAGE HILL RD
BROOKSIDE DRIVE
South Mountain
WYOMING AVE
PROSPECT ST
RIDGEWOOD RD
East Branch Rahway

Interchange with New Jersey Route 24

The equation shows the potential need for over 700 spaces. The origins of these trips are spread over a large area covering Morris, Warren, Sussex, Passaic, and Essex Counties. The distribution of these origins indicates that the parking spaces to be provided should not be concentrated at the interchange of I-78 and Route 24 but should be dispersed over the upstream end of the Route 24 travelshed. Conrail's Morristown Branch has a number of stations in this travelshed. Each railroad station and a number of highway junctions as suggested by the travel data were investigated for their suitability as park-ride lot sites.

The model indicates that over 1700 Journey-to-Work trips using I-78 also use the I-287/County 511 interchange. Another 600 trips pass this interchange in comming from points north and west. The equation shows a potential for a demand of over 200 commuter parking spaces at this interchange. There are large wooded areas on County 511 just east of I-287 at Jefferson Road. There is another large wooded area on the north side of County 511 just west of I-287. An Elks lodge on County 511 - 0.4 mile west of I-287 has a good size paved lot. It is recommended that these sites be investigated further.

The equation indicates that commuters would support a small lot of approximately 50 spaces on Route 24 just west of Morristown. This area is rural with a number of wooded areas adjacent to the highway. A joint use arrangement may be possible at the Morris County Park.

At Morristown Station parking is at capacity and the only area available for expansion has poor access for carpoolers. At Morris Plains Station parking is at capacity and expansion is not practical although possible at Route 53 just north of Route 202. These two stations are not recommended for carpooler parking.

The equation estimates 80 car utilization of a lot at Route 10 and I-287. Two possible sites are an area on the north side of Route 10 between the northbound and southbound roadways of I-287 and the area within and surrounding the jughandle at Ridgedale Avenue. The Ridgedale Avenue site is the more attractive. At Route 10 and Ridgedale Avenue the Department owns a parcel of land which was acquired for the extension of Ridgedale Avenue north of Route 10. There is also an existing jughandle adjacent to this parcel. Current plans call for ultimate relocation of this jughandle to the west. There is presently room for approximately 50 parking spaces and the future relocation of the jughandle will provide for expansion. On the south side of Route 10 just east of Ridgedale Avenue is land acquired for a never-built jughandle. This can also be used for future expansion.

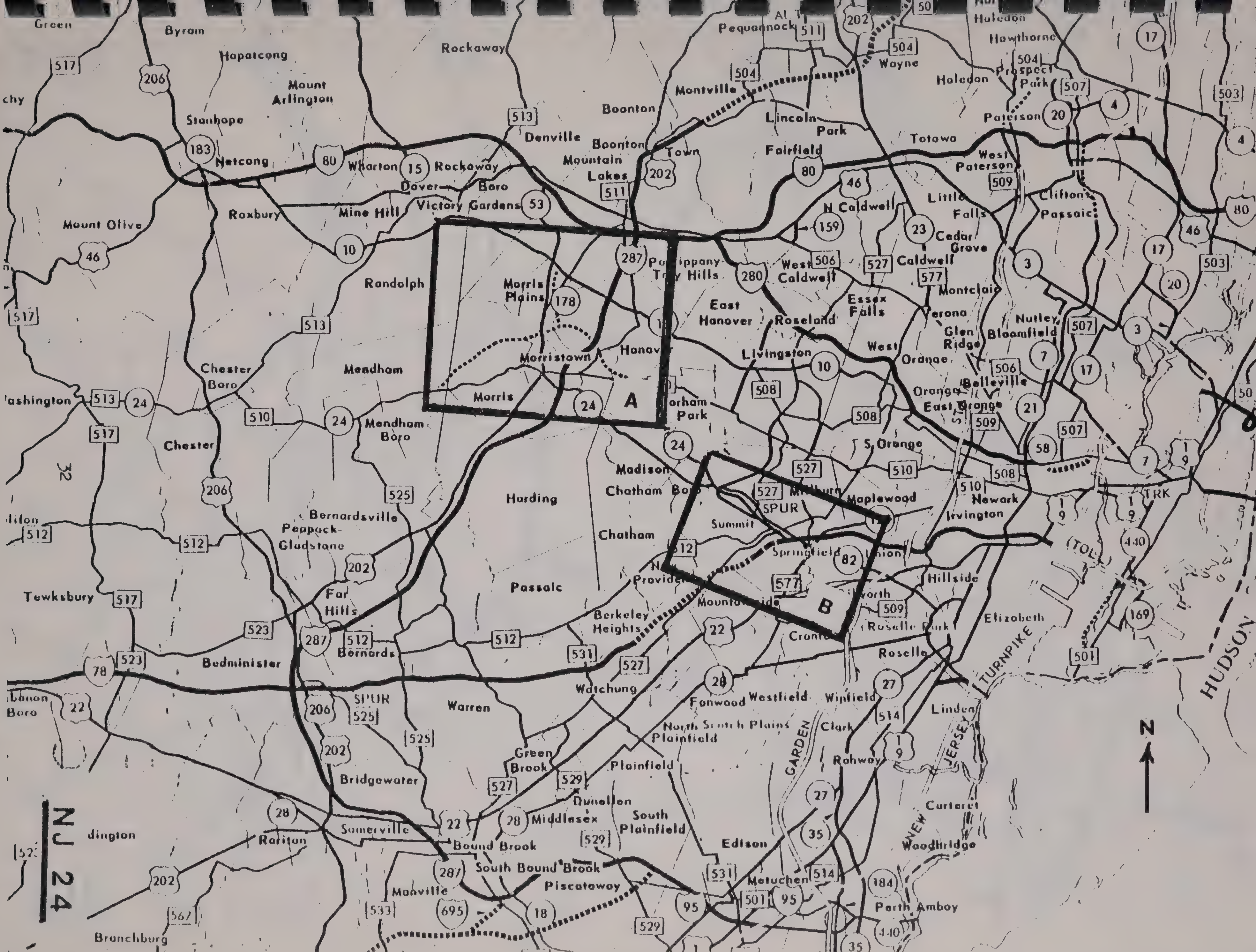
At the interchange of Route 24 with John F. Kennedy Parkway is a large shopping center with considerable multi-level parking. It is unlikely that such expensive parking spaces were provided in excess of capacity in the Christmas season. The complexities of the interchange may make use of the lot at the proposed interchange of Route 24 and Eisenhower Parkway, 1.5 miles to the west, just as convenient. Almost all the trips come from Livingston Township. In the Township, at Livingston Mall is a large bus park-ride lot with several hundred excess spaces that have no restrictions and could serve carpoolers with only moderate indirection. In conclusion, no action is recommended for this interchange.

The partial interchanges at the eastern end of Route 24 are close together, and will be grouped for this anlaysis. They are the interchanges with Summit Avenue, Hobart Avenue, Broad Street, and Springfield Avenue.

The Springfield Avenue--Broad Street couplet provides the best access and the best opportunities for site location. The Department has a maintenance yard at Springfield Avenue and Route 24 with enough excess space to readily provide commuter parking for approximately 60 cars. The yard's gate would have to be moved back from Springfield Avenue but this is already part of future development plans for the yard. On the other side of Springfield Avenue along the ramp connecting Springfield Avenue with Broad Street is a large gently sloping lot with good drainage. Site distance is not good on the side toward Route 24 and a traffic island restricts access to the Springfield Avenue side. Nevertheless it is a potentially desirable site with good access. On Route 124 just west of Broad Street is a grouping of commercial establishments dominated by Kings and Medi Mart. There appears to be excess parking capacity behind Kings, and directly on Route 124 is a paved area in rough condition which does not appear to be used. It is recommended that a total of 150 commuter parking spaces be provided at this interchange. The locational order of preference is the order of presentation above.

Route 24 Freeway is currently under study from its present terminus at John F. Kennedy Parkway to I-287. Its actual western terminus has not yet been decided. Large park-ride lots have been proposed for each potential interchange. This study strongly supports the inclusion of park-ride lots in the final design at <u>each</u> of the interchanges, but only a total of 200 spaces are recommended. If no further construction takes place on Route 24 Freeway, the existing stub at its present terminus could serve as an ideal park-ride lot. The uncertainty of Route 24 Freeway design precludes any other recommendations in this area.

Conrail's Morristown Branch is in the Route 24 corridor with Convent, Madison, Chatham, Short Hills and Millburn Stations in the section parallel to existing and proposed Route 24 Freeway. All five stations have permit and/or metered parking. There is some excess capacity but if the improvements to the rail line currently underway have their desired effect on ridership this capacity may be needed for rail riders. Summit Station on Conrail's Gladstone Branch is also in the corridor. Its lot is in a congested CBD, is at capacity, and expansion would encroach upon park land or dense development. These stations are not recommended for carpool parking.

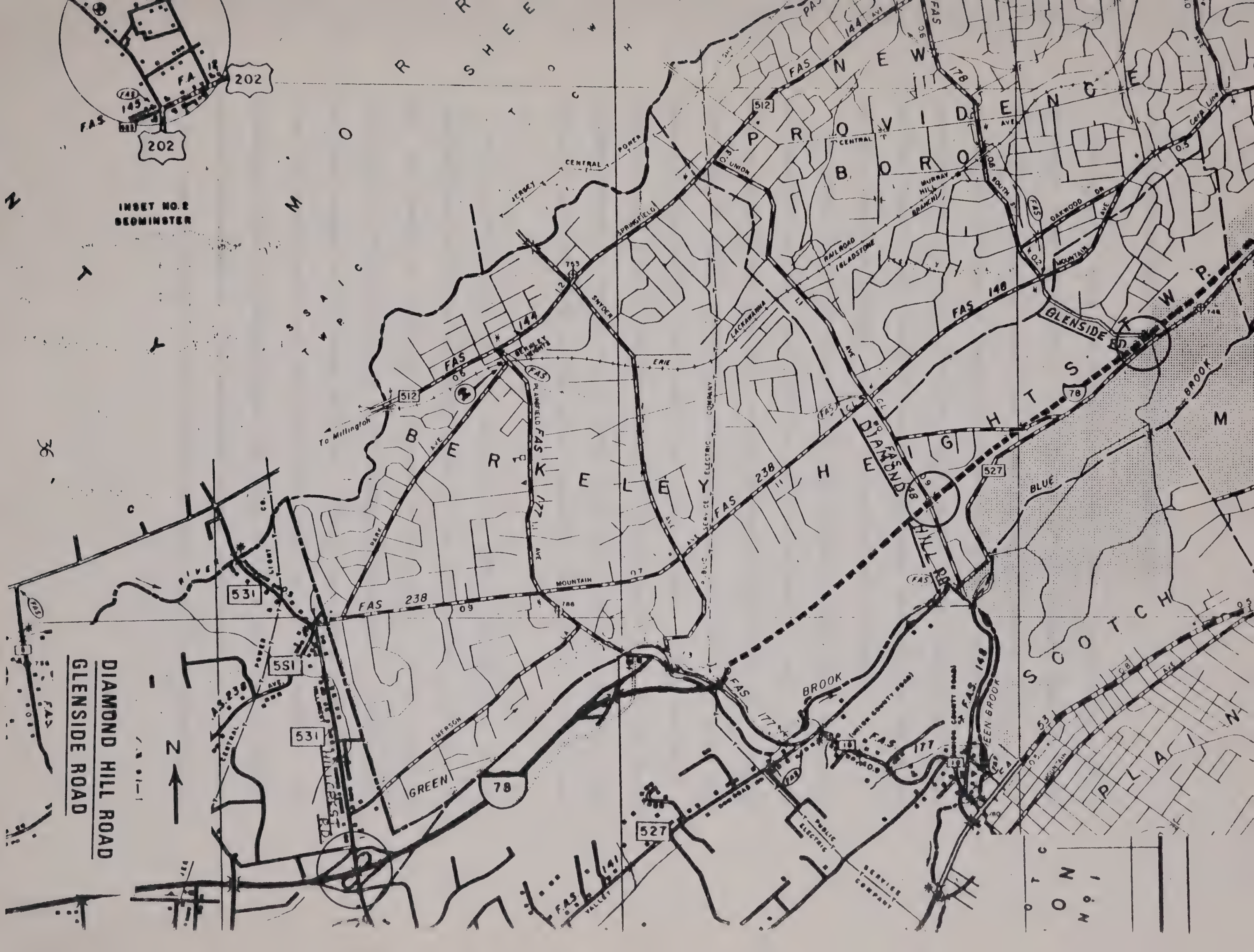

Green
Byram
Hopatcong
Rockaway
Pequannock
Haledon
Hawthorne
Wayne
Mount Arlington
Montville
Prospect Park
Haledon
Paterson
Stanhope
Boonton
Lincoln Park
Netcong
Wharton
Rockaway
Denville
Boonton Town
Fairfield
Totowa
West Paterson
Mountain Lakes
Dover
Boro
Mine Hill
Victory Gardens
Roxbury
N Caldwell
Little Falls
Clifton
Passaic
Mount Olive
Randolph
Cedar Grove
Caldwell
West Caldwell
Montclair
Morris Plains
Essex Falls
Verona
East Hanover
Roseland
Nutley
Glen Ridge
Bloomfield
Livingston
West Orange
Belleville
Orange
East Orange
Chester Boro
Mendham
Morristown
Morris
Mendham Boro
Chester
Madison
Chatham Boro
S. Orange
Millburn
Maplewood
Newark
Irvington
Harding
Summit
Chatham
Bernardsville
Peapack-Gladstone
Springfield
Union
Hillside
Passaic
Far Hills
Tewksbury
Berkeley Heights
Elizabeth
Bedminster
Bernards
Roselle Park
Roselle
Cranford
Watchung
Warren
Fanwood
Westfield
Winfield
Linden
North Plainfield
Scotch Plains
Clark
Green Brook
Plainfield
Rahway
Bridgewater
Dunellen
Carteret
Middlesex
South Plainfield
Somerville
Raritan
Bound Brook
Edison
Woodbridge
South Bound Brook
Piscataway
Metuchen
Manville
Perth Amboy
Branchburg
SPUR
TURNPIKE
NEW JERSEY
GARDEN
HUDSON
(TOLL)
TRK
A
B
N
NJ 24


DENVILLE
PARSIPPANY TROY HILLS
TROY HILLS
PARSIPPANY
MORRIS PLAINS
HANOVER TWP
MORRIS PLAINS
Proposed 24
Ridgedale Av
HANOVER
MORRIS
Morristown Airport
ELKS
Jefferson Rd
Lewis Morris Park
NJ-24
A
N
33


24F STUB
FAS 140
FAS 148
FAS 179
KINGS
DOT YARD
SPRING
NJ-24
B

Interchange with Diamond Hill Road and Glenside Road

The design of this interchange is not finalized but the sensitivity of Berkeley Heights residents to traffic growth suggests that park-ride encouragement in the vicinity of this interchange is inappropriate. In addition, the interchange is likely to be incomplete, and parking opportunities at the County 531 interchange could serve most of the estimated parking demand at Diamond Hill Road with only moderate indirection. Therefore, most of the demand estimated for park-ride spaces at this interchange was transferred to the County 531 interchange for inclusion in the analysis of that interchange.


DIAMOND HILL ROAD
GLENSIDE ROAD
INSET NO. 2
BEDMINSTER
NEW PROVIDENCE BORO
BERKELEY HEIGHTS TWP.
SCOTCH PLAINS
PASSAIC TWP.
MORRIS
FAS 144
FAS 148
FAS 238
FAS 177
FAS 145
FAS 141
GLENSIDE RD.
DIAMOND HILL RD.
MOUNTAIN AVE
PLAINFIELD AVE
SNYDER AVE
SPRINGFIELD AVE
CENTRAL AVE
SOUTH ST
OAKWOOD DR
UNION AVE
PARK AVE
EMERSON
VALLEY RD
GREEN
BROOK
BLUE BROOK
GREEN BROOK
PASSAIC RIVER
ERIE
LACKAWANNA
RAILROAD
GLADSTONE BRANCH
MURRAY HILL
PUBLIC SERVICE ELECTRIC COMPANY
JERSEY CENTRAL POWER & LIGHT CO.
To Millington
202
512
531
527
78
N

Interchange with County Route 531 (Hillcrest Road)

The equation shows the potential for 350 spaces. Approximately 32% of the demand comes from Passaic Township and Berkely Heights which are north of I-78; the remainder comes from 16 municipalities south of I-78.

Gillette Station on Conrail's Gladstone Branch is in Passaic Township approximately two miles from the interchange. The station has excess parking capacity and plenty of room on State owned property for expansion, but could use some grading and stone to improve muddy condition.

On County Route 531 between I-78 and Crestwood Drive is an area which with moderate grading should provide parking for over 50 cars. Encroachment on the I-78 ROW line will provide parking for additional cars. On the east side of County Route 531 immediately north of I-78 is a level area presently occupied by what looks like a chicken coop. Eight tenths of a mile north of I-78 on the east side of County Route 531 is the Union Village Methodist Church with a large paved lot. Approximately the same distance south of I-78 is the Wilson Memorial Union Church with a large lot.

On the south side of U.S. Route 22 in North Plainfield is a huge underutilized lot extending along Route 22 from Rock Avenue in the west to West End Avenue in the east a distance of 0.8 mile. It is currently occupied by a Ginos and a large store undergoing renovation. Several dozen commuters appear to be using this lot. Ninety four percent of the trips from the south could use this lot with little or no indirection. The Renaissance Diner at Wilson Avenue and Route 22 has a large lot of perhaps several hundred spaces. The Department owns a paved excess parcel at Route 22 and Somerset Street in North Plainfield which could hold approximately ten cars.

The railroad station lots serving the municipalities of origin of these trip makers either have excess capacity (Plainfield, Netherwood, Bound Brook) or are at capacity with no room for expansion (Dunellen, Somerville).

Recommendations:

1. Grade and pave the lot at Gillette station. This is in a growing area and proposed improvements to the rail system are expected to increase ridership. The lot should be expanded by 50 to 100 spaces.
2. Thru lease or purchase establish a 250-300 space park-ride lot on Route 22, preferably at the Rock Ave.-West End Ave. site. This will serve 94 percent of the trips from south of I-78.
3. Establish lots totaling approximately 100 spaces at one or more of the sites near the I-78 interchange.
4. Post signs and delineate spaces at excess-parcel lot at Route 22 and Somerset Street.

The Crestwood Drive site should be the first choice. Second choice should be the "chicken coop" site. This lot will serve carpools with members from both north and south of I-78 and also will serve as a pick-up point for carpools entering I-78 west of County Route 531. This lot should be given priority over the Route 22 and Gillette Station lots since it serves those carpoolers least able to find parking on their own.


Gillette
UNION VILLAGE METHODIST CHURCH
WILSON MEMORIAL UNION CHURCH
Excess Parcel
ROCK AVE.
WEST END AVE LOT
N
Watchung Valley Golf Course
Washington Rock State Park
Warrenville
Watchung
Mount Bethel
SPUR 527
FAS 238
F.A.S. 144
F.A.S. 143
F.A.S. 157
F.A.S. 141
531
551
527
529
512
78
22
County 531

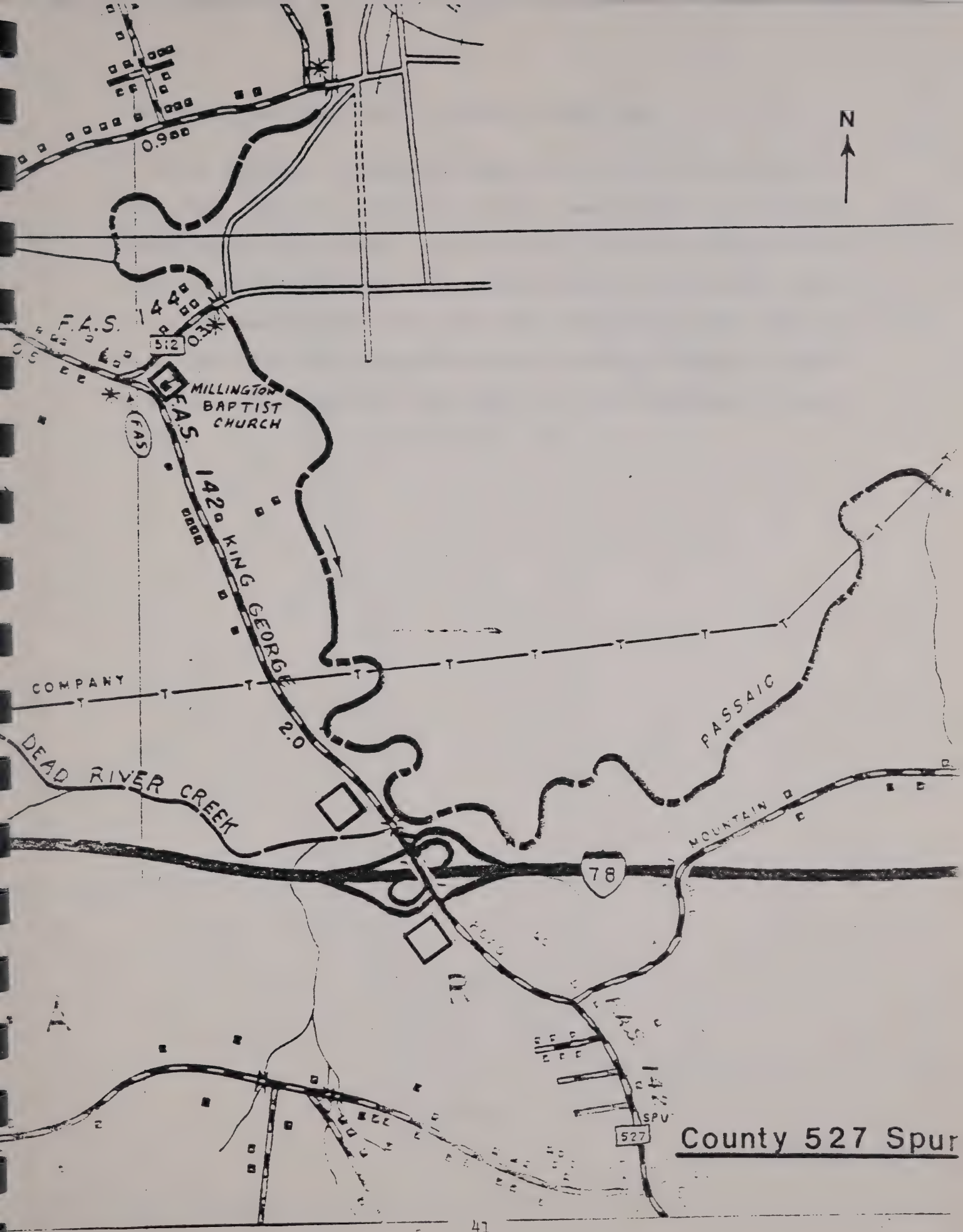
Interchange with County Route 527 Spur (King George Road)

The equation estimates the need for over 125 spaces. Forty percent of these would be for trips originating in Bernards Twp. with the remainder from Warren Twp.

Lyons, Millington, and Stirling stations on Conrail's Gladstone Branch would best serve travelers from Bernards and Warren Townships. Excess parking capacity exists at these stations.

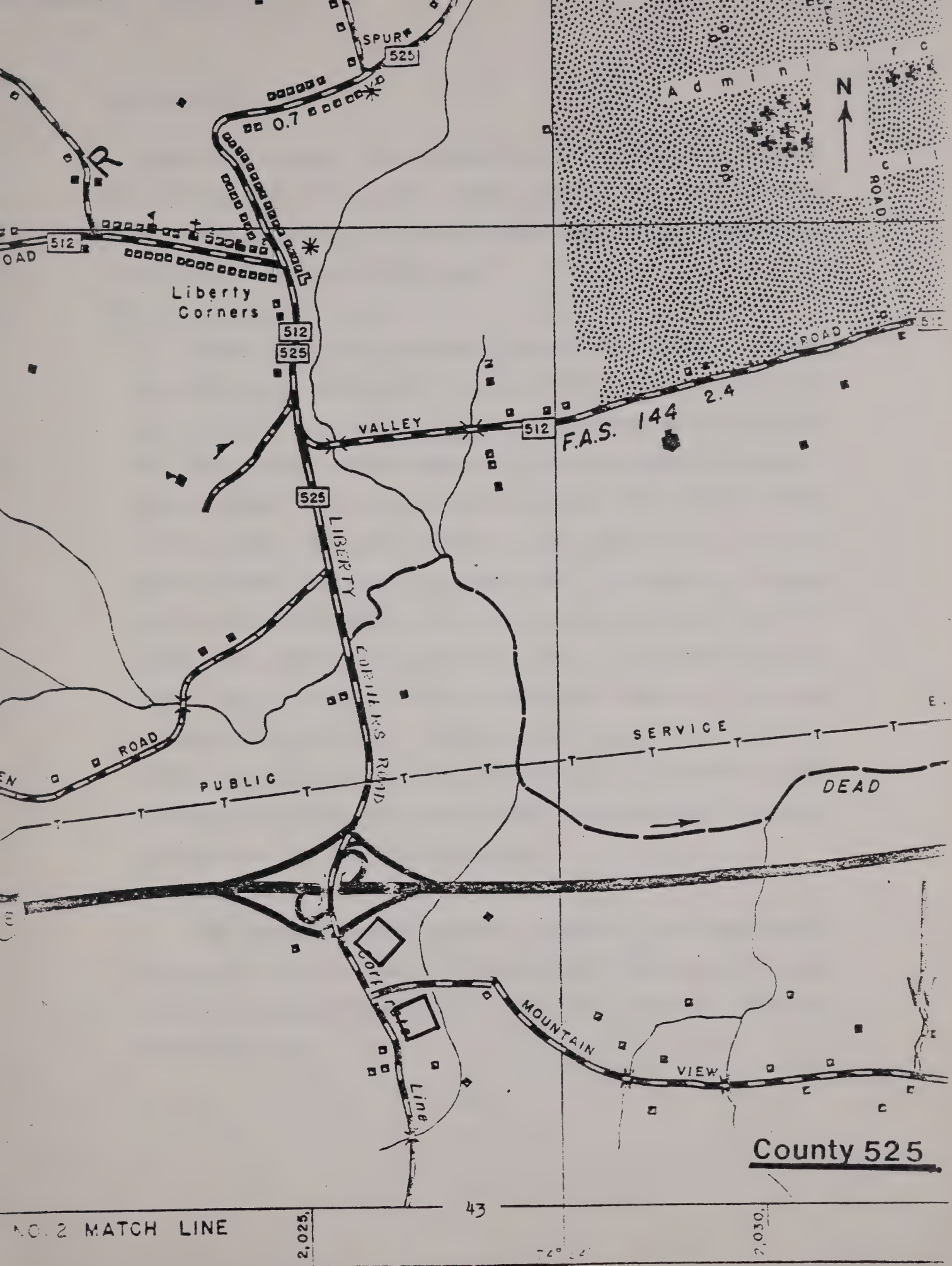
A number of opportunities exist for park-ride lots at the interchange of I-78 and County Route 527S. A large level area on the west side of County Route 527S immediately south of the I-78 ramps is probably the most attractive. The second choice is a level area on the west side of County Route 527S along Dead River Creek (just north of I-78). Three tenths of a mile north of I-78 a high tension line crosses County Route 527S. Nine tenths of a mile north of I-78 is the Millington Baptist Church with a good size lot and a public phone booth.

The establishment of a 125 space lot at one of the sites mentioned in the above paragraph is recommended.


N
0.9
F.A.S. 144
512
0.3
MILLINGTON BAPTIST CHURCH
F.A.S. 142
KING GEORGE
2.0
COMPANY
DEAD RIVER CREEK
PASSAIC
MOUNTAIN
78
527
SPU
County 527 Spur

Interchange with County Route 525 (Liberty Corners Road)

On the east side of County 525 between I-78 and Mountain View Road is a large clear level area. Another large area easily graded and cleared is bounded on the west by County Route 525 and on the north by Mountain View Road. County Route 525 will contribute few carpools to I-78 itself but it is an ideal meeting point for travlers from I-78 west and I-287 north and south. The I-78/I-287 interchange provides no suitable locations for park-ride lots. Establishment of a 200 space lot at this interchange is recommended.


SPUR
525
0.7
R
512
OAD
Liberty
Corners
512
525
VALLEY
512
F.A.S. 144
2.4
ROAD
525
LIBERTY
CORNERS
ROAD
SERVICE
PUBLIC
DEAD
MOUNTAIN
VIEW
Line
N
Admin
ROAD
County 525
43
NO. 2 MATCH LINE
2,025.
2,030.

Interchange with I-287

As described earlier, a lot is proposed at the interchange of I-78 with County 525 to serve carpools with members entering the I-287 interchange from more than one leg. The potential demand also justifies consideration of park-ride lots on the individual legs.

Trips from the South

Enough trips from the south converge at the junction of Routes 202, 206, and 28 to justify a 100 space lot for I-78 users. The location is such that it would also be utilized by users of I-287 and U.S. 22. Two locations suggest themselves, the Raritan Station of Conrail's Raritan Valley Branch and the shopping centers at the Route-202-206-28 traffic circle. The Raritan Station lot has approximately 100 excess unpaved spaces. Parking is by permit only. The station is located three blocks from Route 202. The largest of the commercial lots at the interchange (Somerset Shopping Center) has a "No Commuter Parking" sign. The other large lots are at Channel and Bowlerama. The access to these lots is excellent. Carpoolers are not going to pay to park or bother with permits in this area. Therefore it is recommended that 200 commuter parking spaces be negotiated with the owners of the commercial enterprises at the 202-206-28 interchange.

Trips from the North

The demand for commuter parking is minimal. The excess capacity at Conrail's Far Hills Station on the Gladstone Branch and the lot proposed at the interchange of I-78 with County 525 should adequately serve these trips.

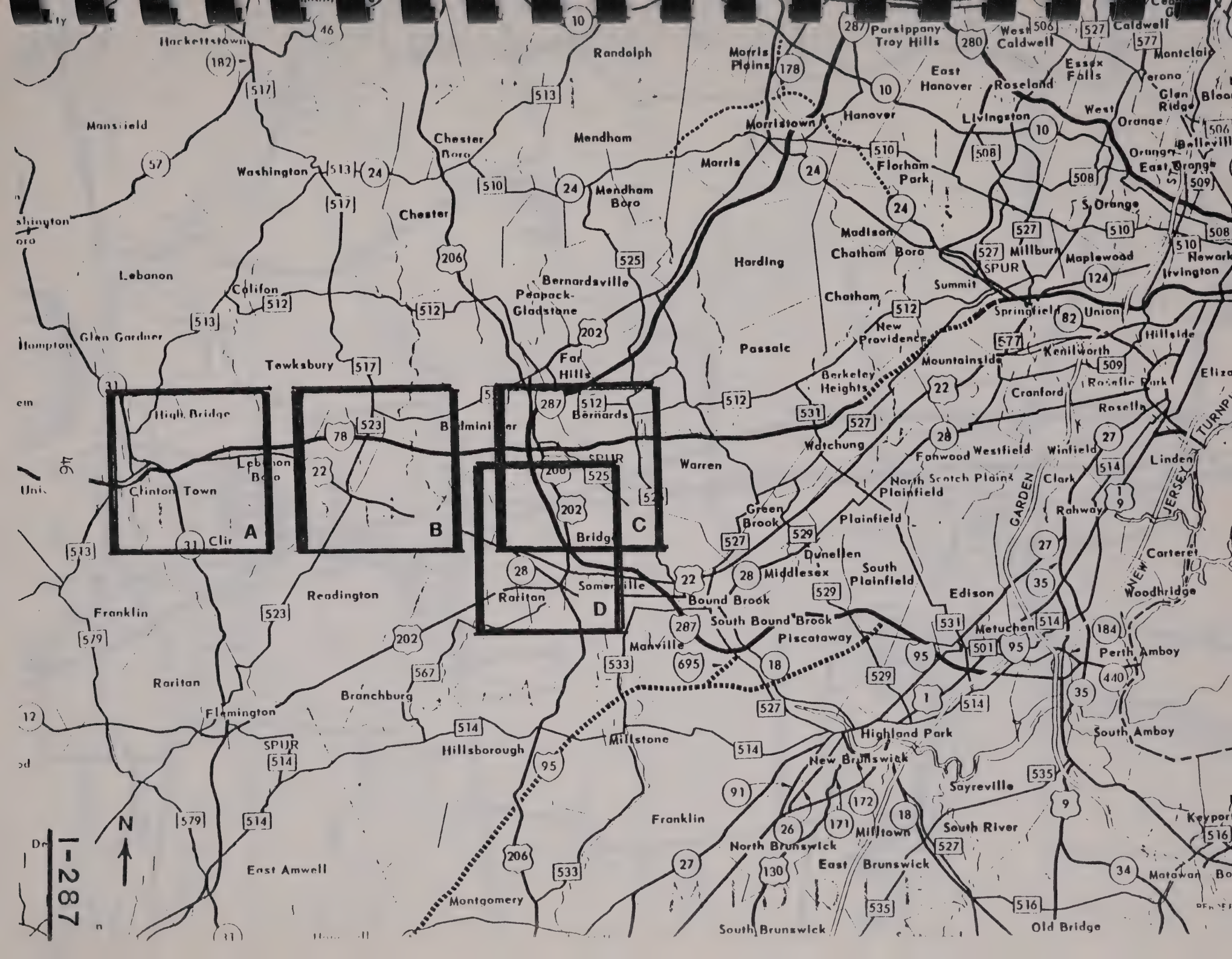
The equation indicates that 170 spaces could be used by these trips.

At the interchange of I-78 with County 523 is an existing, paved park-ride lot serving 41 cars, one motorcycle, and one bicycle. The capacity appears to be 100 cars and there is room for expansion. The property is under municipal jurisdiction and exists to provide access to a parcel, the development of which will eliminate the park-ride lot. The interchange is surrounded by vacant land well suited to parking lot construction. While this favorable situation exists, a parcel of sufficient size for a 100 space lot should be purchased and held for future use.

At the interchange with County 523 Spur five parked cars were observed. The southwest quadrant of the interchange contains a golf course. The other three quadrants are suitable for parking lot construction. The establishment of a 20 space lot at this interchange is recommended.

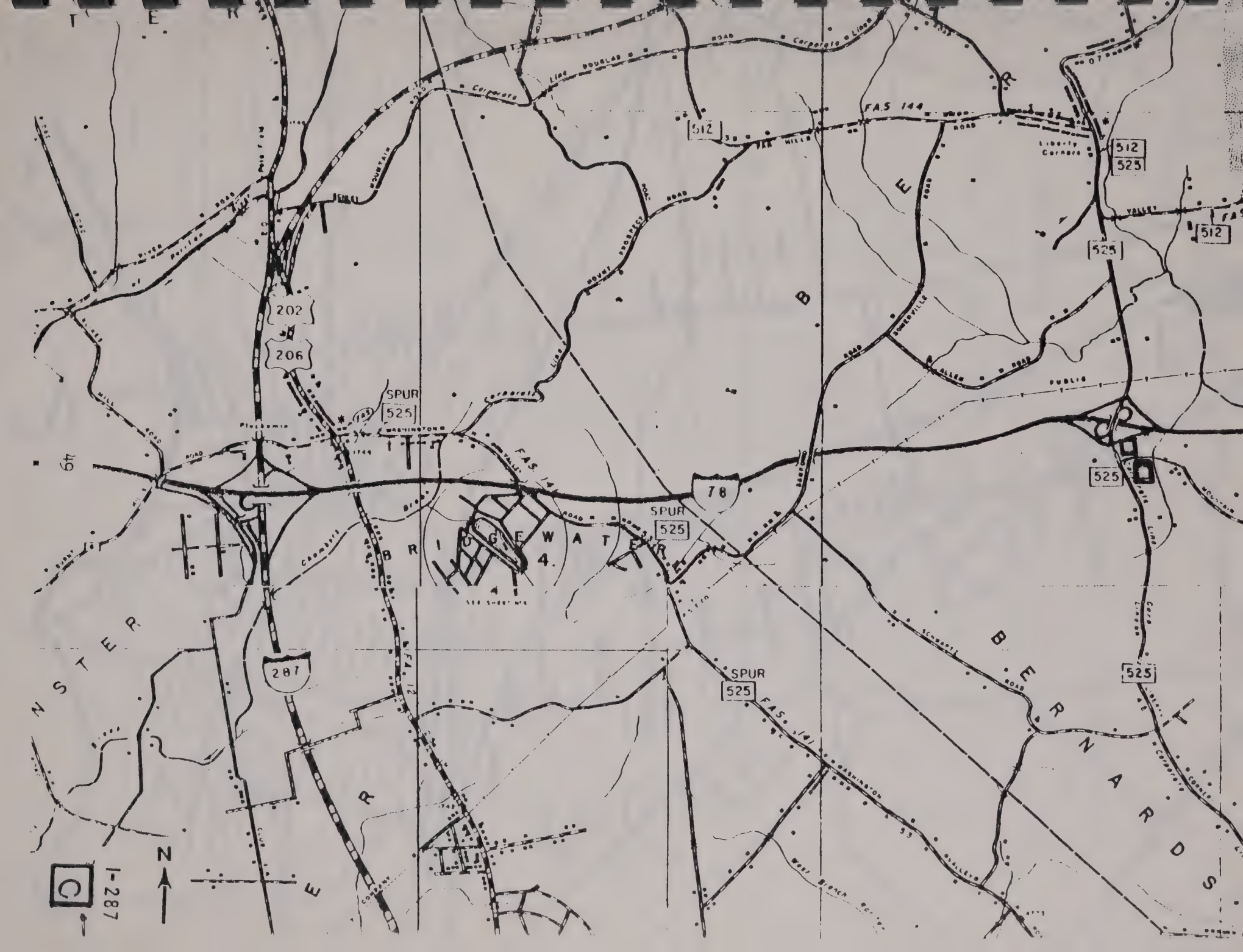
Over 20 cars were observed parked on the north side of Route 22 just east of Lebanon-Cokesbury Road. An interchange with I-78 exists at Lebanon-Cokesbury Road 0.3 mile from Route 22. A level parcel is for sale in the southeast quadrant of the I-78/Cokesbury road interchange. The existing lot is paved, can double as a bus park-ride lot, and can provide for more than the existing demand. The purchase of this lot is recommended. Failing that, a 40 space lot should be established at the I-78 interchange.

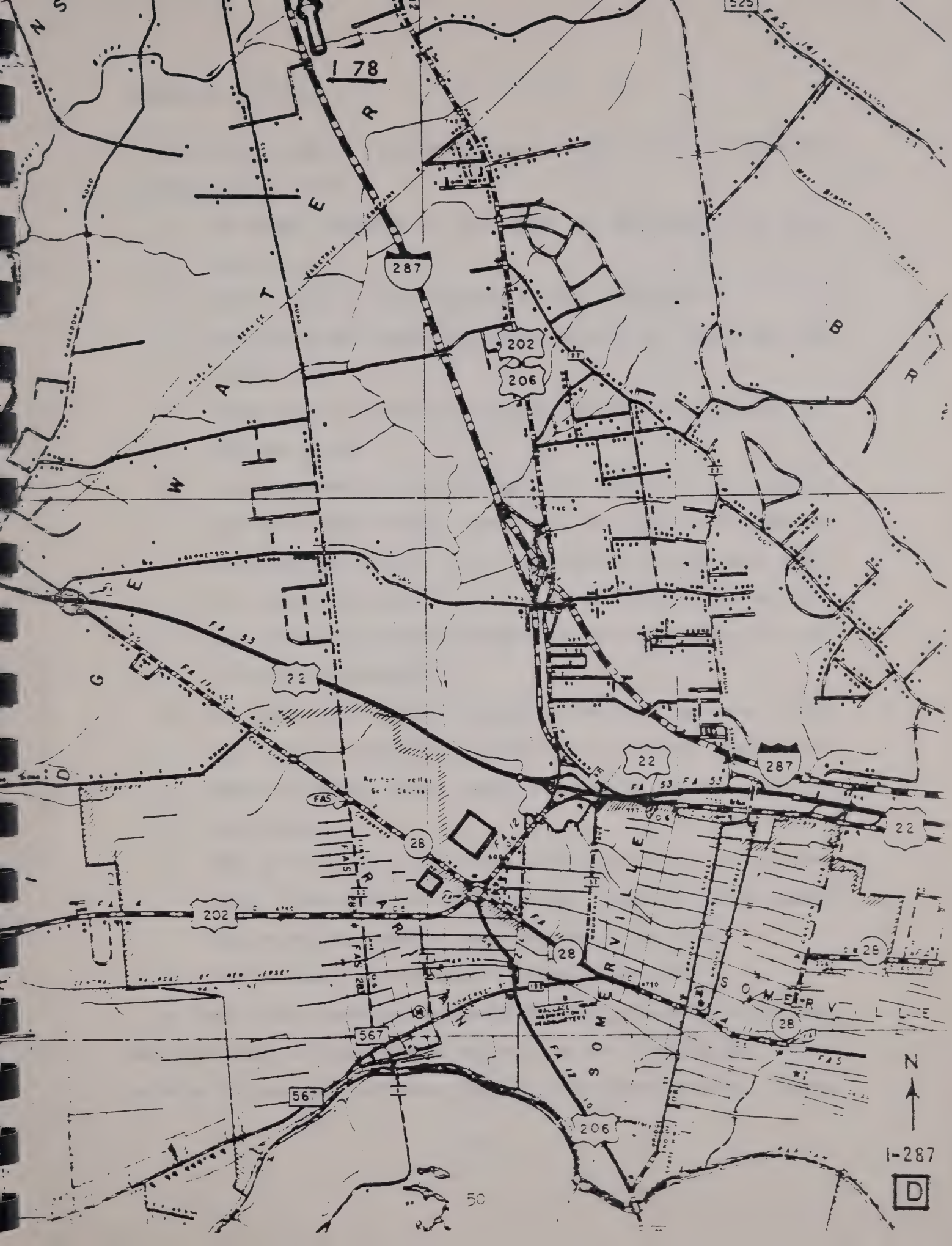
Level fields occupy the eastern quadrants of the I-78/NJ 31 interchange. The establishment of a 40 space lot at this interchange is recommended.


A
B
C
D
I-287
N
Hackettstown
Randolph
Morris Plains
Parsippany-Troy Hills
West Caldwell
Caldwell
Montclair
East Hanover
Roseland
Essex Fells
Verona
Glen Ridge
Bloomfield
Mansfield
Chester Boro
Mendham
Morristown
Hanover
Livingston
West Orange
Washington
Mendham Boro
Florham Park
East Orange
Chester
Morris
S. Orange
Madison
Chatham Boro
Millburn
Maplewood
Irvington
Lebanon
Califon
Bernardsville
Peapack-Gladstone
Harding
Chatham
Summit
Springfield
Union
Glen Gardner
New Providence
Hillside
Tewksbury
Far Hills
Passaic
Mountainside
Kenilworth
Berkeley Heights
Cranford
Roselle Park
High Bridge
Bernards
Watchung
Roselle
Lebanon Boro
Warren
Fanwood
Westfield
Winfield
Linden
Clinton Town
North Scotch Plains
Plainfield
Clark
Rahway
Green Brook
Dunellen
Middlesex
South Plainfield
Carteret
Readington
Somerville
Raritan
Bound Brook
Edison
Woodbridge
Franklin
South Bound Brook
Piscataway
Metuchen
Perth Amboy
Manville
Raritan
Branchburg
Flemington
Millstone
Highland Park
South Amboy
Hillsborough
New Brunswick
Sayreville
Franklin
Milltown
South River
North Brunswick
East Brunswick
East Amwell
Montgomery
South Brunswick
Old Bridge


HIGH
BORO
TOWN
TOWN
LEBANON
BORO
OF
CLINTON
TOWN
31
513
78
22
173
40
FA 11
FA 28
SEE SHEET NO 8
SEE SHEET NO 8
11
10
NORTH
DAM
ROUND VALLEY
RESERVOIR
I-287
A
N

517
523
FAS 145
78
Existing
SPUR
BEDMINSTER
N
I-287


202
206
SPUR
525
512
FAS 144
78
287
I-287
N
BRIDGEWATER
BERNARDS


178
287
202
206
22
28
567
525
FAS
FA 53
FA 12
N
I-287
D

Staging and Priorities

There are a number of considerations in staging and prioritizing the proposals of this study:

1. The demand projected in this study may take time to be fully realized.
2. Parking lots are easily expanded if land is available.
3. Land will be more easily and cheaply acquired now than at any time in the future.
4. Gravel lots at convenient locations are preferable to paved lots with poor access.
5. Lots convenient to an interchange, which would allow a carpool to pick up a rider enroute, fill a need for which the alternatives are relatively inferior to the alternatives for lots which serve as a central meeting point (i.e., a suitable central meeting point has a higher probability of being found than a convenient lot near a specific interchange).
6. The Garden State Parkway's experience has been that when a park-ride lot is established in response to existing demand, that demand ultimately equals supply and a number of these lots are over capacity.
7. Some of these sites will serve trips outside the I-78 corridor (e.g., I-287/County 511 and I-287/New Jersey 10) and the demand will be well in excess of that presented in this report.
8. The Department has pronounced budgetary restraints.

In light of the preceding considerations, the proposed park-ride lots were prioritized as summarized in the table on the following page. First priority is given to constructing lots on State-owned property. Second

I-78 PARK-RIDE LOTS

INTERCHANGE SERVED BY PROPOSED LOT	NUMBER OF SPACES	LOCATION	PRESENT OWNERSHIP	PRIORITY
I-78/NJ 124	220	At Interchange	Private	3
I-78/24 Freeway	50	24F/Springfield Ave.	State	1
	100	Interchange	Private	2
"	200	Proposed 24F Interchanges	State	1
"	80	At NJ 10/I-287 Interchange	State	1
"	50	NJ 24 West of Morristown	Private	4
"	200	At Co. 511/I-287 Interchange	Private	3
I-78/Co. 531	50-100	Gillette Rail Station	State	1
"	250-300	On US 22	Private	3
	10		State	1
"	100	AT Interchange	Private	3
I-78/527 Spur	125	At Interchange	Private	3
I-78/Co. 525	200	At Interchange	Private	2
I-78/I-287	200	Shopping Center at 202-206-28 Circle	Private	3
"	100	Co. 523/I-78 Interchange	Private	2
"	20	Co. 523 Spur/I-78 Interchange	Private	4
"	40	US 22, Lebanon	Private	4
"	40	NJ 31/I-78 Interchange	Private	4

priority is given to constructing lots of 100 or more spaces on land that must be purchased. Third priority is given to negotiated, joint-use, existing lots on private property. Fourth priority is given to constructing lots of less than 100 spaces on land that must be purchased. Within this prioritization it is recommended that the securing of the lot sites, thru purchase or lease, before development makes this impractical, take precedence over improving the sites to a high standard. Land acquisition should be liberal. The lots may be gravel and initially smaller than the projected demand. The lots can be expanded, paved, and lighted as utilization warrants. Leasing with an option to buy would be an ideal arrangement. Finally, the lots at the I-78 interchanges should be given priority over the more distant lots, all else being equal.

The next steps to be taken to implement the proposals of this study are:

1. Design studies of proposed lot sites.
2. Estimate cost of land purchase/lease.
3. Negotiate joint-use arrangements for existing lots.

APPENDIX A

Appendix A

Estimating Demand

A regression model to estimate the demand for park-ride lots at interchanges and other locations along a highway, was developed using park-ride data collected along the Garden State Parkway and data from the 1970 and 1980 Censuses. The data base included all park-ride lots located south of the Raritan toll plaza, and was comprized of 5 lots located at interchanges and 2 lots located at service areas (Figure 1). This model estimates the number of spaces needed at a location based on the number of Census Journey-to-Work trips which pass that location and the number of households in the communities which contribute to the work trips which pass that location. These independent variables were chosen from a large number of possible independent variables which were considered. The variables considered in the study are described in the following paragraphs.

UTIL

This variable is the dependent variable and represents the utilization of parking lots along the Garden State Parkway in terms of the number of cars using it during one day. This data was collected by the Garden State Parkway at park-ride lots along the Parkway in 1980. In terms of predictions, this variable represents the expected demand for spaces at a location.

JTWVOL

This variable is the 1970 auto-driver Journey-to-Work volume passing a particular point on the way to work. This number was obtained by assigning

GARDEN STATE PARKWAY

PARK-RIDE LOTS

LOT NAME	CAPACITY (SPACES)	UTILIZATION (SPACES/DAY)
INTERCHANGE 88	-	68
INTERCHANGE 91	-	102
MONMOUTH SERVICE AREA	193	390
EATONTOWN	179	314
TELEGRAPH HILL	400	127
CHEESEQUAKE SERVICE AREA	256	320
RED BANK SOUTH-HALF MILE RD.	217	200

FIGURE 1

the 1970 Census Journey-to-Work trip table to the 1990 statewide traffic model network. This assignment loaded trips onto the highway network using a minimum time path criteria (i.e., people use the path which minimizes the time of travel). JTWVOL at a point is the number of trips which pass that point which have not previously passed an accesible park-ride lot. For an interchange it represents the number of trips entering the freeway at that interchange. Two variations of this variable were also investigated. The first LJTW is the log base ten of JTWVOL, while the second SJTW is the square root of JTWVOL. Figure 2 plots UTIL against JTWVOL.

LJTW

This variable is a transformation of the JTWVOL variable and is the log base ten of that variable.

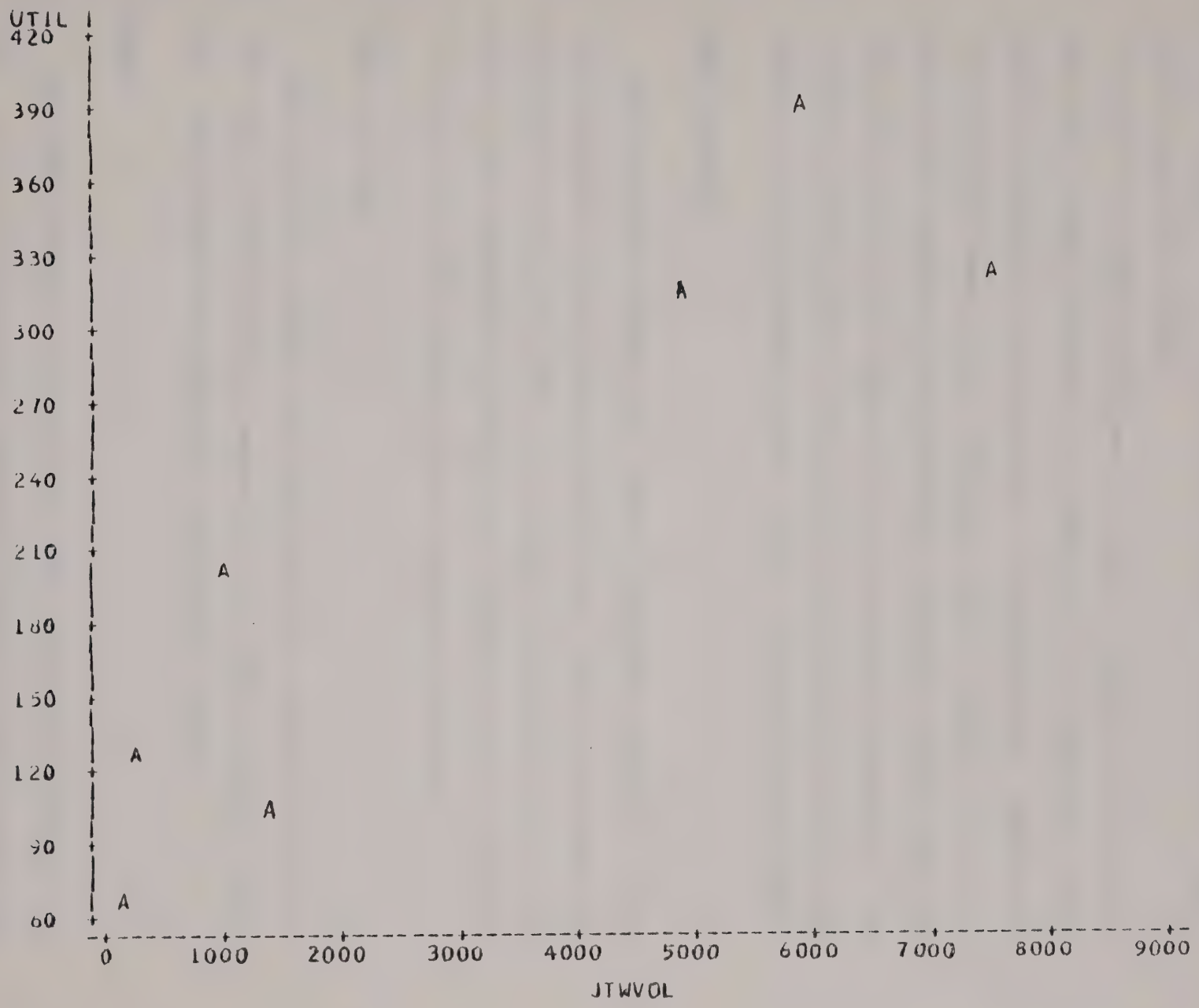
SJTW

This variable is a transformation of the JTWVOL variable and is the square root of JTWVOL.

INDEX, LIND, SIND

The INDEX at a point is the number of Journey-to-Work trips which pass that point destined for municipalities with more than 10 employers employing 100 or more persons. This number was determined by loading the 1970 Journey-to-Work trip table on the 1990 highway network to determine the trip tables for trips passing various points. Then the number of trips destined to the selected destinations were manually tabulated at each point of interest. Trips which passed an accessible park-ride lot, previous to arriving at the point of interest, were not included in the value of the

Figure 2


STATISTICAL ANALYSIS SYSTEM
PLOT OF UTIL*JTWVOL LEGEND: A = 1 OBS, B = 2 OBS, ETC.
UTIL
420
390
360
330
300
270
240
210
180
150
120
90
60
A
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
JTWVOL

INDEX at that point. Two variations of this variable were also examined. The first, LIND, was the logarithm base ten of INDEX, and the second, SIND, was the square root of INDEX.

The use of the INDEX variable was an attempt to identify auto work trips which had a higher propensity for ridesharing. A correlation study, relating ridesharing to characteristics of the destination, investigated the correlation between percent ridesharing and the number of firms with more than 100 employees at the destination municipality and the number of firms with more than 250 employees at the destination municipality. The correlation between percent ridesharing and the employment variables was stronger for the 100 employee variable. Figure 3 plots UTIL against INDEX.

HHSEV and HHEIG

These variables represent the number of Households which are in the origin communities of the Journey-to-Work trips. HHSEV is the number of households in 1970, while HHEIG is the number of households in 1980. The value of these variables at a location can be obtained from the origins of the trips in the JTWVOL variable at that location and census data.

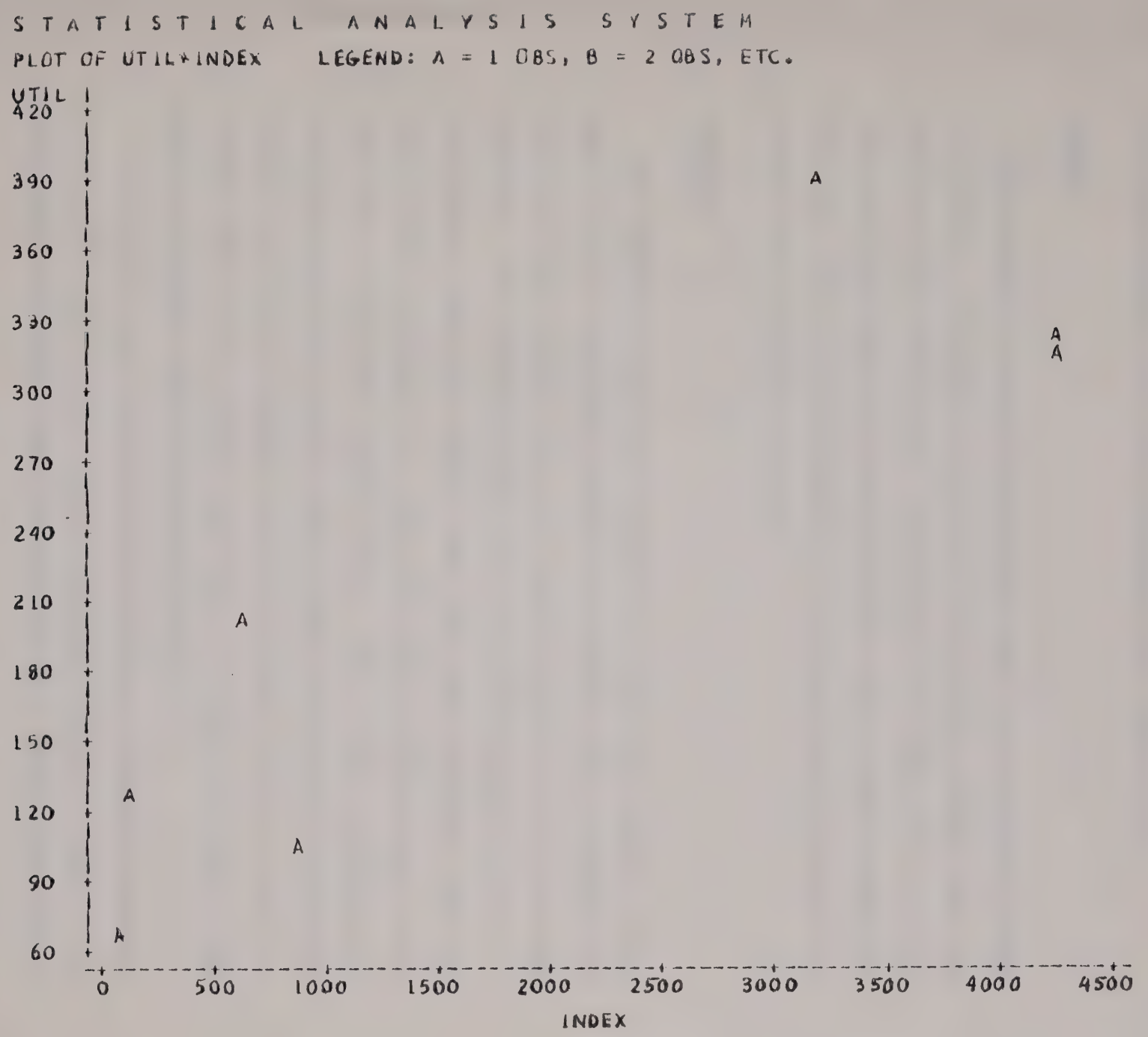
POPSEV and POPEIG

These variables represent the population of the origin zones of the JTWVOL trips. POPSEV represents seventy data, and POPEIG represents eighty data. They are determined similarly to the household variables.

GSPDAT

The GSPDAT variable is the sum of the 1980 northbound ramp volumes for which the lot of the respective dependent variable is the first lot accessible. For lots at service areas this variable was an aggregate of all

Figure 3


STATISTICAL ANALYSIS SYSTEM
PLOT OF UTIL*INDEX LEGEND: A = 1 OBS, B = 2 OBS, ETC.
UTIL
420
390
360
330
300
270
240
210
180
150
120
90
60
0
500
1000
1500
2000
2500
3000
3500
4000
4500
INDEX

ramp volumes from interchanges not served by a park-ride lot from the service area upstream to the first interchange with a park-ride lot.

AVGINC

This variable represents the average income of the tripmakers passing any location. It was derived using the JTWVOL data and average income data for each of the origin zones. Unfortunately, the income data was unreliable and this variable was poorly correlated with the other variables in the study. Due to the unreliability of the income data this variable was dropped from the regression analysis.

ANALYSIS

The regression analysis was performed in steps using a general linear model. The first step was a correlation analysis of all the variables to determine which variables were most highly correlated to the dependent variables. The correlation matrix from this analysis appears as Table 1. This analysis showed the GSPDAT, JTWVOL, and INDEX variables along with some of their variations (i.e., LIND, SIND, LJTW, SJTW) were most correlated with the dependent variable (UTIL). None of these variables were clearly more attractive than the others so each was used as the independent variable in a linear regression model of the form: UTIL = A + B(X), to determine which if any provided a good model. The resulting models, along with some regression statistics appear in Table 2.

After these initial regressions were performed, a stepwise regression procedure was used to add a second independent variable to each of the above equations to improve their predictive ability. This procedure uses

Table 1. Correlation Matrix for Park-Ride Study

	UTIL	INDEX	JTWVOL	GSPDAT	LIND	SIND	LJTW	SJTW	HHSEV	HHEIG	POPSEV	POPEIG
UTIL	1.000	.871	.903	.801	.874	.897	.882	.919	.795	.751	.837	.796
INDEX	.871	1.000	.972	.791	.911	.984	.892	.966	.540	.497	.615	.578
JTWVOL	.903	.972	1.000	.931	.900	.965	.900	.983	.679	.645	.751	.723
GSPDAT	.801	.791	.931	1.000	.787	.832	.806	.898	.758	.746	.825	.817
LIND	.874	.911	.900	.787	1.000	.969	.993	.963	.592	.544	.648	.610
SIND	.897	.984	.965	.832	.969	1.000	.954	.987	.590	.545	.651	.620
LJTW	.882	.892	.900	.806	.993	.954	1.000	.963	.631	.584	.686	.649
SJTW	.919	.966	.983	.898	.963	.987	.963	1.000	.684	.664	.748	.716
HHSEV	.795	.540	.679	.758	.592	.590	.631	.684	1.000	.997	.993	.994
HHEIG	.751	.497	.645	.746	.544	.545	.584	.664	.997	1.000	.987	.993
POPSEV	.837	.615	.751	.825	.648	.657	.686	.748	.993	.987	1.000	.997
POPEIG	.796	.578	.723	.817	.610	.620	.649	.716	.994	.993	.997	1.000

TABLE 2. Models with One Independent Variable

	MODEL	R^2	STD ERROR
1.	UTIL = 43.20162372 + 3.73729813(SJTW)	.84	54.052
2.	UTIL = 105.45816832 + 0.03753502(JTWVOL)	.82	58.799
3.	UTIL = 47.01171363 + 4.35692353(SIND)	.80	60.487
4.	UTIL = - 252.18340211 + 150.73465799(LJTW)	.78	64.623
5.	UTIL = - 235.01221833 + 152.44240945(LIND)	.76	66.541
6.	UTIL = 109.2350075 + 0.05156848(INDEX)	.76	67.235
7.	UTIL = 105.73469390 + 0.01172106(GSPDAT)	.64	82.038

partial correlations to determine which independent variable, not already in the equation, will provide the best model when included in the equation. In each case HHSEV was entered as the second variable, and the resulting equations appear in Table 3.

A cursory examination of the regression statistics for the estimated equations reveals that the models with two independent variables provide better fits (i.e. higher R^2 and lower standard error of estimate) than the models with one independent variable. Within each table, there is very little difference in the predictive ability of the two best equations. Since the statistical criteria do not suggest an equation which is clearly superior in either table, the reasonableness of the equations was examined to determine which was preferable.

Intuitively, the relationship being estimated should pass through the origin. That is there should be no demand for parking spaces at locations that no trips pass. Thus an equation which has an intercept that is not significantly different from zero would be preferable to an equation with a large intercept.

The statistics which allow a comparison of this type are summarized in Table 4. The t-statistic is used to test the null hypothesis that the intercept is equal to zero. Of all the equations estimated, the equation which offers the best overall fit and satisfies the criteria of having an intercept which is not significantly different from zero is:

UTIL = 56.4 + 3.19 (SIND) + .00101 (HHSEV).

This equation is the one which is used to estimate the future demand for park-ride parking spaces for I-78.

In some instances it might be more convenient to use only one independent variable to estimate the number of spaces. In these cases the

TABLE 3. Models with Two Independent Variables

	MODEL	R^2	STD ERROR
1.	UTIL = 56.37765022 + 3.19076679(SIND) + 0.00100865(HHSEV)	.91	45.261
2.	UTIL = 99.14302561 + 0.03693888(INDEX) + 0.00113501(HHSEV)	.91	46.625
3.	UTIL = 55.85950015 + 2.86811117(SJTW) + 0.00077521(HHSEV)	.90	49.321
4.	UTIL = - 142.28918366 + 108.37787814(LIND) + 0.00105901(HHSEV)	.88	52.531
5.	UTIL = 103.80836910 + 0.02804054(JTWVOL) + 0.00083392(HHSEV)	.88	53.808
6.	UTIL = - 154.38364197 + 108.01623482(LJTW) + 0.00098189(HHSEV)	.87	54.865

TABLE 4. Results of T-Test

Ho: INTERCEPT = 0

EQUATION	INTERCEPT	T	CONCLUSION(= .05)
UTIL = A + B(SJTW)	43.202	1.10	Do not reject Ho
UTIL = A + B(JTWVOL)	105.458	3.24	Reject Ho
UTIL = A + B(INDEX) + C(HHSEV)	99.143	3.79	Reject Ho
UTIL = A + B(SIND) + C(HHSEV)	56.378	1.70	Do not reject Ho

equation, UTIL = 43.2 + 3.74 (SJTW) offers the best fit to the existing data, and is preferred to the other models in Table 2.

Application

The regression equation was derived from data collected along the Garden State Parkway and should be applied with caution along facilities which differ significantly from it. The Parkway is a limited access, toll facility, which primarily serves work trips bound for northeast New Jersey and New York. Table 5 shows the distribution of trip ends for trips using the Parkway and can be used as a guide when determining where the equation can be applied.

The equation estimates the utilization of park-ride lots based on the number of 1970 auto-driver Journey-to-Work trips and the number of households served by the lots. For the purposes of this study a trip was served by the first accessible lot it passed on its journey to work and was not considered in subsequent lot calculations. Example: Suppose the utilization of lots located at each of the interchanges in Figure 4 is to be estimated. The auto-driver Journey-to-Work trips destined for municipalities with 10 or more firms with 100+ employees (INDEX) and the number of 1970 households served by each entrance to the facility (HHSEV) are presented on the figure.

To estimate the utilization at interchange A, the number of trips and number of households which would be served by a lot at that location must be determined. Then these values are substituted into the equation. Since interchange A is a partial interchange and only those trips accessing the facility at A are served by a lot at that location, the equation for utilization at A is:

TABLE 5. Percent of Total Auto-Work Trips by Destination for the Garden State Parkway. *

Hillside	16%
Newark	11%
Lincoln Tunnel	10%
Linden City	5%
Union Twp.	3%
Elizabeth	3%
Jersey City	3%
Edison Twp.	3%
Sayreville	3%
Cranford	2%
Woodbridge	2%
New Brunswick	2%
Holland Tunnel	2%
Metuchen Boro	1%
Rahway	1%
Perth Amboy	1%
Carteret	1%
I-80	1%
G. Washington Bridge	1%
Staten Island	1%
Brooklyn	1%
All others	27%
TOTAL	100%

* Sample taken just south of Raritan Toll Booth

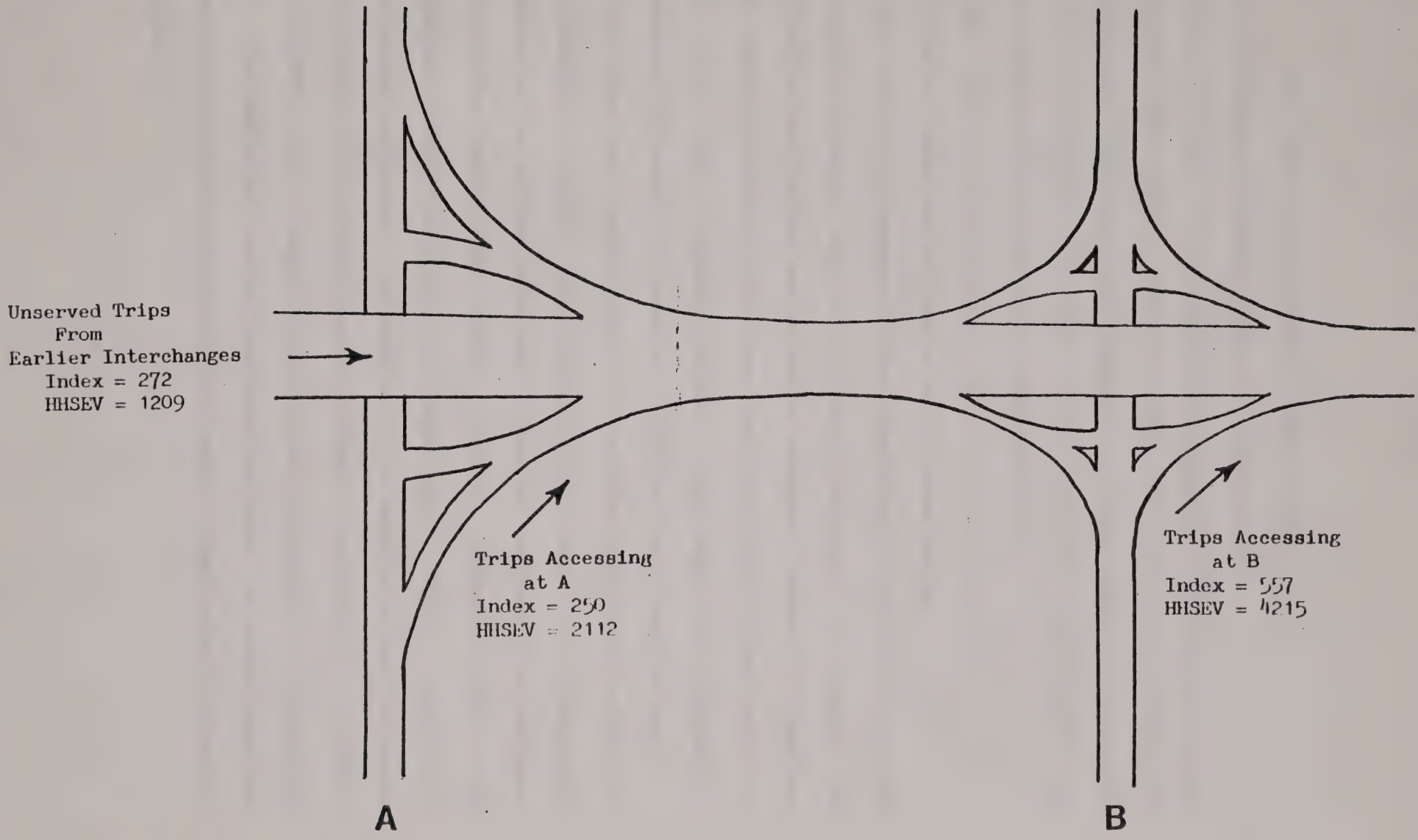

Unserved Trips
From
Earlier Interchanges
Index = 272
HHSEV = 1209
Trips Accessing
at A
Index = 290
HHSEV = 2112
Trips Accessing
at B
Index = 557
HHSEV = 4215
A
B

Figure 4

$$UTIL = 56.4 + 3.19\ (250)^{0.5} + .00101\ (212).$$

and the predicted utilization equals 107 spaces per day.

The interchange at B is a full interchange and a lot at this location would serve trips already using the facility as well as trips accessing the facility at B. Since the trips accessing at A have already been considered in the lot calculation at A, they are not considered at interchange B, and the equation for lot utilization at interchange B is:

$$UTIL = 56.4 + 3.19\ ((272 + 557)^{0.5}) + .00101\ (1209 + 4215),$$

resulting in a predicted utilization of 154 spaces per day.

The value of the dependent variable predicted by the model is in terms of spaces utilized per day, not in terms of the size of lot required. In most applications the two may be nearly synonymous; however, in locations where there is significant shift work each space might be used more than once a day. Such a situation exists on the Garden State Parkway at interchange 105 where a 179 space lot is utilized by 314 cars per day.

As a final note, caution should be used when substituting values for the independent variables which are outside the range of the independent variables in the original data base. A statistical summary of pertinent variables from the data base appears in Table 6. The use of values of the independent variables outside of the ranges shown in Table 6 could result in erroneous predictions. For example, if the equation is used to predict the utilization of a lot which serves no trips or households (i.e., INDEX = 0, and HHSEV = 0), it results in a predicted utilization of 57 spaces per day. This prediction does not invalidate the model, but rather shows the absurd predictions which can occur if the model is used beyond its range of application.

TABLE 6. Summary of Statistics on Regression Inputs

VARIABLE	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
UTIL	217.29	125.01	68.00	390.00
JTWVOL	2979.29	3007.78	90.00	7450.00
SJTW	46.58	30.73	9.49	86.31
INDEX	2095.29	2111.81	83.00	5108.00
SIND	39.08	25.74	9.11	71.47
HHSEV	25898.57	50400.20	1525.00	144729.00

APPENDIX B

Copy / J. Huggler

Form AD-40 5/77 NEW JERSEY DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO Mr. Robert Atkins

FROM John E. Obermeier
Acting Director, Div. of
Comp. Trans. Planning

SUBJECT Route I-78, Union County DATE 3/18/81 TELEPHONE NO. 2-3294

In reference to a subject memorandum from Dennis Keck to Amy Rosen, dated February 11, 1981 (copies of which were forwarded to you and Joseph Huggler by Amy Rosen on February 18, 1981), I submit the following request:

The Ridesharing category information needed should consist of:

1. A summary statement of ongoing ridesharing efforts (car and van pool) in the I-78 corridor roughly bounded in the west by County Route 523, in the south by New Jersey Route 28, in the east the New Jersey Turnpike, and the north by County Route 512. The information should include (if available) the number of major employers, employees, and car and van pools participating in the ridesharing program. Similar information should be provided (if available) by Joseph Huggler for existing E & H-type paratransit services in the same general area described.

2. A summary, as requested in (1) above, for services that are anticipated in the future for this corridor based on information or experience known at this time.

The information requested should be made available to my office not later than APRIL 1, 1981. By copy of this memo, I am asking Joseph Huggler to submit his contribution directly to me to avoid possible mix-ups. Should you have additional questions on this request, please call me.

John E. Obermeier

John E. Obermeier

cc: Joseph Huggler
Dennis Keck

Form AD-40 5/77 NEW JERSEY DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO John Obermeier FROM Amy M. Rosen

SUBJECT Route I-78, Union County DATE 3/31/81 TELEPHONE NO. 2-1030
Summary of On-Going Ridesharing Efforts

Attached per your request of March 18, 1981 is an Office of Ridesharing summary relating to 128 employers with 29,743 employees in the subject corridor. (Individual employer surveys are also attached).

The October 1979 issue of covered employment trends published by New Jersey Department of Labor and Industry indicates total private sector employment of 211,644 commuters in the 17 municipalities along Route I-78, Union County. Based on the 128 employers surveyed to date, a rough estimate is that 933 private employers are in the corridor with average employment of 227 employees each.

Projects by municipality are as follows: (See attached).

Amy M Rosen

AMR:RMA:ms
Attachments

T-RS-1275 7/80

Project # _____
Supervisor Irene A Lincoln (609) 292-4934
Coordinator _____

RIDESHARING DATA SHEET

Company 128 companies combined active/semi-active
County Ridesharing in the I-78 corridor, Union County

Rideshare Program
Potential Gasoline, Pollutant, and Parking
Reductions as of 3/27/81

STATUS: Total Employees 29,743 Employees Ridesharing 8404 28.25%

MODE: Car Pooling 4389 Cycling 206 Bus Transit 1967
Van Pooling 493 Walking 1156 Rail Transit 193

METHOD: _____

		CAR POOLS	VAN POOLS	BUS POOLS
Vital Statistics	Number	1693	60	1
	Average Round Trip	30	50	10
	Average Riders	2.6	10	45
Annual Reductions	Employee Costs	$6,220,730.80	$206,688	$33,679.36
	Parking Spaces	2709	540	44
	Gasoline	1,242,952.80 gal.	412,941.15 gal.	6729.41 gal.
	Hydrocarbons	253,190.05 lbs.	89,116.30 lbs.	1370.78 lbs.
	Carbon Monoxide	1918,007.70 lbs.	637,211.87 lbs.	10,384.19 lbs.
Employer Goals	Number	1693	60	1
	Average Round Trip	30	50	10
	Average Riders	2.6	10	45

MUNICIPALITY	COVERED JOBS	ESTIMATED FIRMS	FIRMS SURVEYED	PERCENTAGE OF COMMUTERS NOT IN SINGLE OCCUPANT VEHICLES
Elizabeth	48,890	215	37	31.65%
Union	32,617	144	29	29.70%
Linden	29,212	129	3	15.14%
Plainfield	11,781	52	2	40.00%
Summit	10,877	48	3	35.37%
Cranford	10,041	44	7	20.86%
New Providence	9,879	44	1	15.39%
Springfield	9,449	42	14	22.53%
Kenilworth	8,945	39	9	21.94%
Hillside	8,710	38	7	43.04%
Clark	7,908	35	2	19.64%
Westfield	6,083	27	2	5.71%
Mountainside	5,895	26	6	18.52%
Berkeley Heights	3,409	15	5	12.17%
Scotch Plains	3,075	14	---	---
Garwood	2,742	12	1	10.14%
Roselle Park	2,131	9	1	26.18%
TOTALS	211,644	933	128	27.95%

Form AD-40 5/77 NEW JERSEY DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO Mr. Dominick A. Botteri
Supervisor, Office of
Ridesharing

FROM Ms. Irene Lincoln
Ridesharing Coordinator

SUBJECT Route I - 78, Union County DATE 3-27-81 TELEPHONE NO. 4-0237

Summary of on-going Ridesharing efforts

	Total Companies	Total Employees	Car Pooling	Car Pools	Van Pooling	Van Pools	Cycling Walking	Bus Transit	Rail Transit
Active Ridesharing	64	18,822	3,798	1,453	485	58	781	1,767	129
Some Ridesharing	64	10,921	591	240	8	2	581	200	64
Total Ridesharing	128	29,743	4,389	1,693	493	60	1,362	1,967	193

Active Ridesharing = 6,960 employees 36.98%

Some Ridesharing = 1,444 employees 13.22%

Total Ridesharing = 8,404 employees 28.25%

L:fs

Form AD-40 5/77 NEW JERSEY DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO Mr. John E. Obermeier
Acting Director
Div. of Comp. Trans. Planning

FROM Joseph G. Huggler
Supervisor
Office of Special Programs

SUBJECT Elderly and Handicapped DATE 3-20-81 TELEPHONE NO. 2-8885

In reference to your memo dated March 18, 1981, the area outlined in Paragraph 1 covers portions of Somerset, Essex, and Union Counties. A complete rundown of all elderly and handicapped para-transit services operating in these areas follow:

SOMERSET: Ten organizations are now providing transportation services to elderly and handicapped residents of Somerset County. These services include both scheduled and demand response operations, most of which are available 5 days per week. Combined equipment of all organizations include 2 large buses, 6 mini-buses, 24 vans, 16 station wagons, and 23 sedans.

UNION: Thirty five organizations provide transportation services to the elderly, handicapped and low income residents of Union County, 5 days a week. Services also include portal to portal and fixed route transportation. Vehicles currently available include 24 buses, four of which are wheelchair lift equipped, 5 sedans, 19 station wagons, and 33 vans, seven of which are wheelchair lift equipped.

ESSEX: Forty nine organizations are now providing transportation services to elderly and handicapped residents of Essex County. Services include both scheduled and demand response operations, most of which operate 5 days per week. Combined equipment of all organizations includes, 4 large buses, 43 mini-buses, 75 vans, 41 station wagons, and three sedans, These totals include 16 vans which are equipped with wheel chair ramps or lifts.

JOSEPH G. HUGGLER

Form AD-40 5/77 NEW JERSEY DEPARTMENT OF TRANSPORTATION

MEMORANDUM

TO Memorandum of Record FROM Thomas M. Batz

SUBJECT Route 78 Analysis DATE 7/81 TELEPHONE NO.

A. Eastern Section - Local-Express Split to NJ Turnpike

This section had areas where demand exceeded capacity by nearly 25 percent. For example, the section between Route 24 Freeway and Springfield Avenue has a capacity of 8,810 vehicles yet the demand calculated for this area six months after construction is completed would be 10,525 vehicles. This alone under normal conditions without an HOV lane would cause a queue on Route 78 of several miles. Depending on successive hourly volumes, the resulting congestion could last for the entire peak period.

The HOV lane design of using the express roadway would increase this queue greatly because it would be reserving forty percent of the capacity for approximately twenty-four percent of the vehicles which have two or more occupants.

Therefore, this section of roadway was not simulated by the PRIFRE model.

B. Western Section - Route 287 to Local-Express Split

This section was simulated by PRIFRE for normal operation, an HOV lane with a two occupant per vehicle restriction, and an HOV lane with a three occupant per vehicle restriction.

1. Eastbound

It was determined that under normal conditions queues would form near the Hillcrest Avenue and Diamond Hill Road interchanges six months after construction was completed. This would be due largely to the heavy on-ramp volumes at these interchanges. Queues would be approximately two miles long. After one year of operation, this queue would be nearly five miles long and the two on ramps would also have large queues waiting to get on Route 78.

Under the two occupant per vehicle HOV plan, six months after construction the same area would be congested to a greater extent. The queue would extend approximately four miles and the ramps would also have some queuing. A year after construction a six mile queue would exist with enormous queues on the two on ramps.

The three occupant per vehicle plan six months after construction showed a queue of approximately six miles with large queues on the on ramps. A year after construction an eight mile queue would be present with enormous queues on the two on ramps.

2. Westbound

Under normal conditions the roadway would be congested in two areas. Six months after construction a queue of two and a half miles would exist east of Glenside Avenue and another of one-half a mile east of Hillside Avenue. The Hillcrest Avenue off ramp would also be over capacity by nearly four hundred vehicles. One year after construction the queue would be six miles long. The Route 24 freeway on ramp would be over capacity by nearly three hundred and fifty vehicles and the Hillcrest Avenue off ramp would be nearly seven hundred vehicles over capacity.

Six months after construction if a two plus HOV lane were implemented, the queue would be five miles long and the off ramp would be over capacity. One year after construction the queue would be eight miles long and the on and off ramp would be over capacity.

Under the three plus scheme, the queues would be slightly longer than under the two plus schemes and the two ramps would be over capacity.

Recommendation

Due to the heavy volumes predicted for Route 78, vehicles will have large delays under normal conditions. However, we believe this demand is larger than will actually occur. People will not sit in queues of this length day after day. They will either change their route or mode of travel or may decide not to even live in this corridor.

Using the volumes given, an HOV lane would be extremely difficult to recommend but a closer look at these volumes should be taken.

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